



Kaysville City General Plan

KAYSVILLE CITY GENERAL PLAN

Adopted by the City Council November 21, 2019

CONTENTS

	<u>Page</u>
COMMUNITY	2
Identity and Character	2
Defining Features	3
Growth and Development	3
LAND USE	4
Housing	4
Business and Industry	4
Agriculture	4
Recreation	5
Education	5
Public Buildings and Grounds	5
Open Space	6
TRANSPORTATION AND TRAFFIC CIRCULATION	7
Streets and Bicycle Facilities	7
Transit	8
PLAN FOR ADDITIONAL MODERATE INCOME HOUSING	9
GLOSSARY	G-1
APPENDIX A	

COMMUNITY

Background Kaysville is located approximately 20 miles north of Salt Lake City between the Wasatch Mountain Range and the Great Salt Lake. Stream channels with dense vegetation run through the City from the mountains to the lake. The community enjoys panoramic views and the appropriate use of these many features.

Kaysville was settled in 1850 as a farming community and began to grow as a place of residence between the employment centers of Salt Lake City and Ogden. Steady growth continues today making Kaysville a destination of choice for safe residential community with supporting businesses and public facilities.

In keeping with the City theme, “Utah’s Hometown in the middle of everything,” community leaders continue to provide appropriate services to maintain the distinct character of the City.

The residents are family-oriented, have a strong commitment to quality education, and enjoy a peaceful lifestyle with a sense of community that makes it an attractive place to live, work, shop and play.

The community enjoys recreation programs and parks located throughout the City. Residents and community leaders work closely to create and maintain an atmosphere of cooperation and civic pride.

Goals and Policies

I. Identity and Character

- A. Kaysville should be primarily a residential community with a vision to promote business, industry and public use.
- B. The City should preserve and strengthen family orientation, public order, personal safety and security.
 - 1. Strengthen each public safety agency, upgrade equipment and add personnel as needed.
 - 2. Provide public safety education and harm prevention programs.
 - 3. Involve the public in community safety, personal security and emergency preparedness activities.
- C. The sense of cohesive community should be preserved and enhanced.
 - 1. Provide meeting places, functions, and events.

2. Promote organizations and activities that meet community standards.
- D. The cultural heritage of the City should be promoted by using genuine architecture to continue the Kaysville story.

II. Defining Features

- A. The City Center should be developed as a traditional main street.
 1. Create a large and varied grouping of uses to sustain civic and economic activity.
 2. Interconnect all sites for pedestrian and vehicular access.
- B. The historical character and appearance of the Old Kaysville Townsite should be preserved.
- C. Historical landmarks, sites and structures should be preserved and renovated. Consider historical value in property use decisions.
- D. The natural environment should be enhanced.
 1. Enlarge and improve the community forest.
 2. Beautify the entrances to the City with landscaping.

III. Growth and Development

- A. Growth should mostly occur through development within the City. Development should improve public safety and sense of community. An adequate revenue base should be developed to fund City operations and infrastructure.
 1. Refurbish or replace deteriorating structures so that land is used to its long-term potential.
 2. Reserve land and promote development that is high quality, diversified and adaptable to changing conditions.
 3. Encourage businesses and industries to locate and invest within the City.
 4. Regulate the more intensive uses that create traffic and public service problems and costs.
- B. Small areas adjacent to the City should be annexed when development occurs. Implement the Annexation Policy Plan.

LAND USE

Background Land use in Kaysville is mostly low density residential with agriculture and open space, businesses and industries. Housing will be the greatest use of land with business, industry, recreation, education, and other uses to support that housing.

Goals and Policies

I. Housing

- A. Housing should be located throughout the City and restricted only where it is incompatible with other necessary uses.
 - 1. West of I-15, allow for similar housing densities in existing neighborhoods while considering medium density housing along the major streets and higher density housing near transit stops and arterial streets (200 North, Interstate 15, and the West Davis Corridor).
 - 2. East of I-15, allow for housing compatible with and complimentary to existing neighborhoods while considering medium densities along major streets and higher densities near transit stops and arterial streets (200 North, Main Street, Interstate 15, and U.S. 89).
- B. The majority of the housing should be single unit attached or detached. The City will seek to provide a variety of housing choices throughout the community including a means for allowing homes of a variety of sizes. Multiple unit housing should consist mostly of duplexes (two unit structures) and some three to six unit structures dispersed throughout the City.
- C. Housing development should have a minimum of through vehicular traffic and a maximum of open space.
- D. Housing developments should essentially pay for themselves.

II. Business and Industry

- A. Most sites used primarily for business or industry should be located on major streets. Mitigate impacts on adjacent residential uses through compliance with ordinances and regulations.
- B. Home occupations should be located throughout the City, but not be allowed to change or interfere with the character of residential areas.

III. Agriculture

- A. Agriculture (tilling of the soil) should be allowed in all residential areas.
- B. Animal husbandry should be allowed in all residential areas on those lots that are adequate in size.

IV. Recreation

A wide variety of accessible, developed and undeveloped recreation lands should be provided.

- 1. Natural recreation lands include Great Salt Lake, trail systems, ponds, streams, Wasatch National Forest, Bonneville Shoreline Trail, and East Mountain Wilderness Park.
- 2. Working recreation lands include hobby farms, garden plots, Utah State University Botanical Center, and other agricultural lands.
- 3. Developed recreation lands include parks, playgrounds, recreation centers, schools, school sites, churches, church sites, golf courses, and commercial recreation sites.
- 4. Implement the Recreation Facilities Impact Fee Facilities Plan.

V. Education

- A. Providers should be encouraged to locate schools on appropriate sites.
 - 1. Locate junior high and high schools on a major street emphasizing safety and access.
 - 2. Locate elementary and private schools emphasizing safety and access.
- B. Expansion of Davis Applied Technology College (DATC) should be supported.
- C. Utah State University should be encouraged and supported to fully develop Utah Botanical Center.

VI. Public Buildings and Grounds

- A. Most public buildings should be located near Main Street.
- B. Adequate Cemetery facilities should be developed and maintained.

- C. Places of worship should be allowed to service the community.
 - 1. Locate buildings for worship in residential areas.
 - 2. Locate buildings for worship with dispersed congregations on a major street.

VII. Open Space

- A. Kaysville should contain abundant public and private natural, working and developed open space.
- B. The natural resources of Kaysville should be protected, conserved, and improved.
 - 1. Protect and improve stream channels and flood hazard areas through stream channel and flood damage prevention regulations.
 - 2. Assist the owners in protecting ponds and reservoirs for the delivery of secondary water.
 - 3. Conserve and improve wetlands through federal regulation.
 - 4. Preserve natural landscapes and wildlife habitat such as hillsides and woodlands.
 - 5. Preserve East Mountain Wilderness Park as a recreational site and natural landscape and wildlife habitat in association with Wasatch National Forest.

TRANSPORTATION AND TRAFFIC CIRCULATION

Background Transportation facilities consist of streets, transit, railroads, airports, and pipelines.

Kaysville City lies between the Wasatch Mountains on the east and the Great Salt Lake on the west. Traffic to and from this area travels north or south using Interstate 15 and U.S. 89, and may use the proposed State Route (SR) 67 in the future. These are State facilities and the principal arterial streets affecting Kaysville. Main Street and 200 North Street link the major traffic generators, the City Center, and the principal arterials, and provide access to the four quadrants of the City. They are the minor arterial streets. Collector streets link the local areas and the arterial streets and are located at appropriate intervals. Significant local streets provide other necessary connections. Local streets are all others.

Kaysville City participates in the Wasatch Front Regional Council's Active Transportation Committee and supports the Bicycle and Trails Plan. Routes within the city should be categorized per the Council's recommendation. Kaysville City benefits by supporting active routes and trails, which has an increasing role of transporting people throughout the city.

Bus routes of the Utah Transit Authority serve Kaysville and will have an increasing role and importance in transporting people to, from and within the City.

Kaysville is crossed by two rail corridors. The Union Pacific Railroad and FrontRunner Commuter Rail transport freight and passengers through Kaysville.

Kaysville is well served by the International Airport in Salt Lake City and the municipal airport in Ogden. Flights from Hill Air Force Base affect Kaysville, but the resulting impacts are addressed in special studies and regulations.

Eight fuel pipelines in four locations cross Kaysville.

Goals and Policies

I. Streets and Bicycle Facilities

- A. An adequate street system should be provided.
 1. Implement the Major Street Plan.
 2. Design and develop streets to encourage traffic speeds that are appropriate for adjacent land uses.
 3. Restrict development that is not compatible on arterial and collector streets to preserve their function.

- B. Bicycle facilities should be provided.
 - 1. Implement the Kaysville Active Transportation Plan (See Appendix A).
 - 2. Provide public facilities on public property (open spaces, parks).
 - 3. Encourage owners to provide bicycle facilities with public access on private property.

II. Transit

- A. The City should work with the Utah Transit Authority to provide improved bus facilities and services to, from and within Kaysville.
- B. Paratransit should be encouraged within and around Kaysville.

PLAN FOR ADDITIONAL MODERATE INCOME HOUSING

Background This is “an estimate of the need for development of additional moderate income housing within the City, and a plan to provide a realistic opportunity to meet estimated needs for additional moderate income housing if long-term projections for land use and development occur.” (Utah Code 10-9a-403(2)(a)(iii)).

Goals and Policies

Approximately fifteen percent (15%) of the additional housing should be moderate income housing. Kaysville will continue to use the following means and techniques to provide a realistic opportunity for development of a variety of housing, including moderate income housing:

1. Zoning properties townsite (R-T), single family (R-1), diverse (R-D), two-family (R-2), one to four family (R-4), and multiple family (R-M) residential and central commercial (CC) which allows housing.
2. Clustering in residential areas.
3. Permitting multiple unit structures in single family residential zones.
4. Permitting less costly size, design, materials and construction of housing.
5. Facilitating the rehabilitation or expansion of infrastructure that will encourage the construction of moderate income housing.
6. Create or allow for, and reduce regulations related to, accessory dwelling units in residential zones.
7. Allow for higher density or moderate income residential development in commercial and mixed-use zones, commercial centers, or employment centers.
8. Preserve existing moderate income housing.
9. Rezone for densities necessary to assure the production of moderate income housing.

GLOSSARY

Agriculture

The tilling of the soil, the raising of crops, horticulture and gardening, but not including the keeping or raising of farm animals and fowl.

Animal Husbandry

The keeping or raising of farm animals and fowl.

Business

An occupation, profession, trade, or profit-seeking enterprise.

City Center

The area of Main Street and 200 North Street from I-15 to Fairfield Road.

Collector

Collector streets penetrate neighborhoods to distribute traffic to local streets, collect traffic from local streets, and channel traffic into the arterials. Use of collectors by through traffic should be discouraged. Collectors should “collect” traffic and provide for access.

Flood Hazard Area

The area along a stream that is subject to flooding and the area below 4217 feet elevation.

Flood Hazard Zone

The flood risk premium zones on Flood Insurance Rate Maps.

Functional Classification

The streets and highways of an area form a system. They have two main functions: (1) to allow vehicles to move safely and efficiently, and (2) to allow access to property. These functions of a street are basically incompatible. Efficient traffic movement results from clear traffic lanes with minimum interference from the sides so that higher speeds and larger volumes can be maintained. Access to land requires many side movements, called side friction, to and from traffic lanes which interfere with efficient movement within the lanes. Streets are, therefore, classified by function and the characteristics of that function stressed in design.

Hobby Farm

A parcel of land used for agriculture or animal husbandry as an avocation.

Home Occupation

A business or industry conducted in a residential area and incidental and secondary to the housing use.

Housing

A structure or portion thereof that is used for human habitation.

Industry

Activity involving manufacturing or technical production.

Local Street

Local streets are all streets not otherwise classified and provide direct access to abutting land and linkage to other streets. Through traffic movement is deliberately discouraged on these streets.

Major Street

A principal arterial, minor arterial, collector or significant local street identified in the Major Street Plan.

Minor Arterial

Minor arterials connect with and augment the principal arterials and provide for travel to geographic areas within Kaysville. More access to land is provided which results in less movement efficiency. Minor Arterials provide continuity through the City but should not penetrate identifiable neighborhoods.

Moderate Income Housing

Housing occupied or reserved for occupancy by households with a gross household income equal to or less than 80% of the median gross income for households of the same size in the county in which the city is located.

Multiple Unit Housing

Housing with more than one dwelling unit per structure including attached units.

Natural Landscape

An ecosystem not maintained by humans.

Natural Waterway

Those areas, varying in width, along streams, creeks, springs, gullies, or washes which are natural drainage channels where water flows.

Old Kaysville Townsite

The area between I-15 and Main Street and 200 North and 100 South Street, consisting of the west half of blocks 7 and 18, Blocks 8, 9, 10, 11, 14, 15, 16, 17, and the south half of Blocks 32, 33, 34 and 35.

Open Space

Any parcel or area of land or water relatively unoccupied by buildings and set aside, dedicated, designated, or reserved for public or private use or enjoyment.

Paratransit

A form of public transportation service characterized by the flexible routing and scheduling of small vehicles such as taxis, vans, and small buses, to provide shared-occupancy, doorstep, or curbside personalized transportation service.

Principal Arterial

These streets provide for the movement of traffic with as little interference as possible. There is limited access to these streets and they carry a high proportion of the traffic at higher speeds.

Private Open Space

Open space to which access may be restricted.

Public Open Space

Open space maintained for the use of the public.

Recreation

Mental or physical refreshment after work.

Residential

Used for housing.

Significant Local Street

These streets “collect” traffic in shorter distances than collectors and provide for even more land access.

Single Unit Housing

Housing with one dwelling unit per structure.

Transit

A public common carrier transportation system for people, having established routes and fixed schedules.

Wetlands

An area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wildlife Habitat

The natural environment of undomesticated animals living in the wild.



Kaysville Active Transportation Plan

Connecting Our Community
Through Safe Walking & Bicycling

MAY 2016



Appendix A

This Plan was prepared for Kaysville City by Alta Planning + Design and Ensign Engineering, with funding and planning assistance from the Wasatch Front Regional Council.



PROJECT STEERING COMMITTEE &
CONSULTANT TEAM:

KAYSVILLE RESIDENTS, BUSINESS OWNERS

Zach Chatelain, Owner, Biker's Edge
Brady Edwards, Owners, Bountiful Bicycle
Russell Lindberg, Former Planning Commissioner
Lindie DeMill
Shaunna Burbidge

KAYSVILLE CITY

Lyle Gibson, Project Manager & Zoning Administrator
Andy Thompson, City Engineer

KAYSVILLE CITY PLANNING COMMISSION

Lorene Kamalu, Planning Commissioner

FARMINGTON RESIDENTS, BUSINESS OWNERS

Amy Shumway, Farmington Trails Committee
Jeff Hepworth, Owner, Loyal Cycle Co.
Chad Stone

FARMINGTON CITY

Eric Anderson, Project Manager & Associate Planner
David Petersen, Community Development Director

FARMINGTON CITY COUNCIL

Doug Anderson, Councilmember

DAVIS COUNTY

Jeff Oyler, Senior Planner, Planning and Zoning
Issa Perry, Community Outreach Planner, Health Department

DAVIS SCHOOL DISTRICT

David Roberts, Transportation Director
Steve Snow, Budget Director

WASATCH FRONT REGIONAL COUNCIL

Julia Collins, Transportation Planner

ALTA PLANNING + DESIGN

Tom Millar, Project Manager & Planner
David Foster, Senior Designer
Joe Gilpin, Principal-in-Charge

ENSIGN ENGINEERING

Mike Staten, Project Manager

The project team is especially grateful to the thousands of residents who participated by providing original ideas and feedback during the public open house, the online survey and interactive mapping data collection process, and Planning Commission and City Council public hearings.

Appendix A

Table of Contents

1: Introduction	1
About the Plan	1
Why Walking & Bicycling?	1
Local Walking & Bicycling Trends	4
National Walking & Bicycling Trends	6
Connectivity To Transit	6
Existing Plans & Studies	8
Existing Codes & Policies	15
Existing Programs & Events	15
2: Public Involvement	19
Field Investigation Bike Ride	19
Interactive Online Mapping Tool	19
Online Public Survey	19
Public Open House	22
3: Existing System & Needs Analysis	23
Shared-Use Paths	24
Unpaved Trails	24
Bike Lanes	24
Shared Lanes/Roadways	24
Crashes	26
Needs, Gaps, Opportunities, & Constraints	28
Demand, Origin, & Destination Analysis	28
4: Recommended Improvements	31
Introduction	31
Development of Recommended Improvements	31
Recommendation Categories	34
Off-Street Recommendations	34
Spot Improvements	35
On-Street Bikeway Recommendations	38
Cost Estimates	40
Policy, Land Use, or System-Wide Recommendations	41
5: Prioritization & Implementation	49
Introduction	49
Project Prioritization Criteria	49
Implementation Strategies	54
6: Funding	57
Funding Sources	57
7: Conclusion	63
The Future of Walking & Bicycling in Kaysville	63
Design Guidelines	Appendix A
Project Information	Appendix B
Priority Projects	Appendix C

Vision & Goals

“Kaysville will improve quality of life and community health by connecting communities through safe walking and bicycling facilities and programs.”

Goal #1: Education, Promotion, & Encouragement

- Encourage healthy lifestyles and active transportation through community activities and educational outreach centered on the benefits of walking and bicycling, facilities and programs, traffic laws, and proper etiquette
- Promote bicycling and walking as transportation choices that can be used for part or all of commute trips as well as for short trips (under 2 miles)
- Educate the public about active transportation’s contribution to improved air quality
- Educate and encourage school age children and younger so that bicycling and walking are normal parts of their lives
- Advise decisionmakers and community stakeholders about the benefits of walking and bicycling
- Improve awareness of where end-of-trip facilities are (i.e. bike parking, accessible ramps) in order to encourage greater use

Goal #2: Enforcement

- Ensure that enforcement of traffic laws is equitable for all users (motorists, bicyclists, and pedestrians) in order to reduce violations and crashes
- Promote safety and usage through enforcement activities

Goal #3: Funding

- Standardize funding practices and mechanisms for bicycle and pedestrian improvements as an essential piece of recreation and transportation planning
- Support the creation of more local and state funding sources for bicycle and pedestrian improvements
- Reduce overall costs by funding and completing on-street bicycle facility improvements in conjunction with routine and future roadway projects

Appendix A

Vision & Goals

Goal #4: Maintenance

- Maintain roadways and bicycling and walking facilities so that they are safe and comfortable for all users
- Ensure that the design and implementation of bicycling and walking facilities minimize future maintenance costs by specifying quality materials and standard products

Goal #5: Other

- Improve quality of life, including personal and community health
- Increase economic development opportunities for current and future residents, business owners, and stakeholders

Goal #6: Planning & Design

- Plan, design, and maintain a walking and bicycling network that is visible, attractive, and convenient for all users, regardless of age or ability, especially commuters and driving-age students
- Ensure that facility designs encourage correct use and are easy to understand for all users
- Unite the east and west, especially across US-89 and I-15, with bicycle and pedestrian improvements that are safe enough to feel comfortable riding with a young child
- Plan for bicyclists and pedestrians in all future public and private projects
- Improve overall connectivity and accessibility for bicyclists and pedestrians, including access to and from neighborhoods, services, public facilities, schools, shopping, food, entertainment, and transit
- Improve wayfinding through directional and informational signage and maps
- Continually coordinate with other planning efforts and surrounding communities

Goal #7: Safety

- Improve the safety and livability of the community by addressing and fixing deficiencies in on-street corridors and intersections
- Promote greater awareness of vulnerable users, especially by motorists, that will improve safety and comfort
- Ensure equitable access so that all children can safely walk and bike to school

Appendix A

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Unpaved, natural surface trails in East Mountain Wilderness Park

1: Introduction

About the Plan

Kaysville, Utah, was the first city in Davis County to incorporate, officially becoming a city in 1868. According to the American Community Survey, Kaysville is home to 28,480 people, with a population density of 2,819 residents per square mile (10.1 square miles total).

Table 1.1 Kaysville City, Davis County, and Utah Demographics

	Kaysville	Davis County	Utah
Total Population	28,480	317,646	2,858,111
Median Household Income	\$86,982	\$70,388	\$59,846
Median Age	28.3	29.9	29.9
Population Under 16	34.1%	30.5%	28.0%
Population 70 & Over	4.7%	5.9%	6.3%
Population in Work Force	45.4%	48.2%	49.0%

Data: American Community Survey (ACS) Five-Year Estimates, 2010-2014

Deemed “Utah’s Hometown”, Kaysville residents place a high value on a sense of belonging and the spirit of community.

Kaysville boasts several neighborhood trails and paths, parks, the Bonneville Shoreline Trail in the Wasatch foothills, and the regional Denver and Rio Grande (D&RG) Western Rail Trail. The City has chosen to develop the Kaysville Active Transportation Plan in order to guide the development of its bicycling and walking infrastructure, programs, and culture in coming years.

The recommendations in this plan and its appendices may change as the City changes, as priorities shift, and as opportunities arise to complete project. The plan should be considered a fluid document that will move with the City. Some of the projects may need to be implemented incrementally and specific recommendations may be altered; specific and recommended facility types are the ultimate goal, but other treatments may need to be used in the interim.

Why Walking & Bicycling?

Bicycle and pedestrian mobility, or “active transportation”, is an important component of overall mobility, in concert with automobile-based

transportation and transit. There are numerous reasons why, in addition to improved mobility, active transportation should be integrated with the existing development in and future growth of Kaysville.

MOBILITY, INDEPENDENCE, AND AGING IN PLACE

Nearly 40%, or about 11,000, of Kaysville's 28,480 residents are under 16 or 70 or more years old and are not legally able or are less likely to drive, respectively. This plan does not focus only on able-bodied adults that already enjoy walking and bicycling. Rather, it is especially for those who will be given greater independence as the bicycling and walking system improves. As the "under 16" and "70 and over" age groups become more mobile through walking and bicycling, fewer automobile trips will be made by their caretakers and parents, thereby improving the dependents' health, reducing the impact on the environment, and reducing traffic congestion, especially around schools at drop off and pick up times.



Young kids walking to Snow Horse Elementary School (Photo: Shaunna Burbidge)

ECONOMICS

Active transportation makes economic sense. Benefits include decreased family transportation costs¹, lower healthcare costs², more jobs created by way of capital

¹ AAA's "Your Driving Costs" Report (2013); League of American Bicyclists; Bureau of Transportation Statistics "Pocket Guide to Transportation" (2009); Metro Magazine, August (2014); Internal Revenue Service; "Quantifying the Benefits of Nonmotorized Transportation for Achieving Mobility Management Objectives".

² Rous, Larissa, et al. "Cost Effectiveness of Community-Based Physical Activity Interventions". American Journal of Preventive Medicine, 2008; Pratt, Macera & Wang. Higher Direct Medical Costs Associated with Physical Inactivity, 2000; Chenoweth, D. The Economic Costs of Physical Inactivity, Obesity, and Overweight in California Adults: Health Care, Workers' Compensation, and Lost Productivity. Topline Report, 2005.

infrastructure projects³, and higher property values⁴. For example, bicycling and walking construction projects create more jobs per million dollars spent than roadway projects alone.⁵

Facilities such as shared-use paths and trails can also positively influence property values. Nearly two-thirds of homeowners who purchased their home after a path or trail was built said that it positively influenced their purchase decision. Eighty-one percent felt that the nearby path or trail's presence would have a positive effect or no effect on the sale of their homes.⁶

Americans say that having bike lanes or paths in their community is important to them, and two-thirds of homebuyers consider the walkability of an area in their purchase decision.⁷ This preference for communities that accommodate walking and bicycling is reflected in property values across the country.⁸ Houses in walkable neighborhoods have property values \$4,000 to \$34,000 higher than houses in areas with average walkability.⁹

ENVIRONMENT

Air quality along the Wasatch Front fluctuates widely depending on the season and other factors. Promoting active transportation over single-occupant vehicle trips is one way to mitigate seasonal air quality problems. Vehicles are the primary source of PM 2.5 pollutants,

³ Heidi Garrett-Peltier, "Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts", 2011.

⁴ "Walking the Walk", CEOs for Cities, 2009; Lindsey, Greg, Seth Payton, Joyce Man, and John Ottensmann. (2003). Public Choices and Property Values: Evidence from Greenways in Indianapolis. The Center for Urban Policy and the Environment; "Valuing Bike Boulevards in Portland through Hedonic Regression", 2008.

⁵ Heidi Garrett-Peltier, Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts, Political Economy Research Institute University of Massachusetts, Amherst, 2011, 1.

⁶ "Omaha Recreational Trails: Their Effect on Property Values and Public Safety". Rivers and Trails Conservation Assistance, National Park Service. Donald L. Greer, 2000; "Nebraska Rural Trails: Three Studies of Trail Impact". Rivers and Trails Conservation Assistance, National Park Service. Donald L. Greer, 2001.

⁷ Bureau of Transportation Statistics. (2010). Transportation Statistics Annual Report. Retrieved from http://www.bts.gov/publications/transportation_statistics_annual_report/2010/.

⁸ Racca, D.P. and Dhanju, A. (2006). Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas. Prepared for Delaware Center for Transportation and the State of Delaware Department of Transportation.

⁹ Cortright, J. (2009). Walking the Walk: How Walkability Raises Housing Values in U.S. Cities. CEOs for Cities.

which account for almost half of typical winter workday emissions.¹⁰

Bicycling and walking produce low land use impact, no direct air or water pollution, and minimal noise and light pollution. Nearly one-third of all developed land is dedicated to roads. Because of the smaller operator and vehicle footprint of pedestrians and bicyclists, not only does demand for streets and parking decrease but also the amount of road space required. Hence, less dependence on oil to make roads and more space for public space, buildings, food production, and homes.¹¹

As of 2003, 27% of U.S. greenhouse gas emissions were attributed to the transportation sector and personal vehicles accounted for 62% of all transportation emissions.¹² Replacing two miles of driving each day with walking or bicycling prevents 730 pounds of carbon dioxide from entering the atmosphere annually.¹³ This reduction minimizes the transportation sector's air quality impacts, improves air quality, and decreases public health concerns such as asthma.

QUALITY OF LIFE

Bicycling and walking are also important ways to improve quality of life for existing and prospective Kaysville residents. Millennials and baby boomers alike are trending towards locations where they can ride a bike or walk to access their daily needs.

Cities that invest in active transportation are investing in people and their quality of life. Business decisions are increasingly being made based on quality of life amenities for employees and their families. Sidewalks, on-street bicycle facilities, multi-use paths, and transit service are important quality of life indicators. They

10 Utah Clean Air Partnership. Sources of Emissions (<http://www.ucair.org/sources-of-emissions>).

11 Hashem Akbari, L. Shea Rose and Haider Taha (2003), "Analyzing The Land Cover Of An Urban Environment Using High-Resolution Orthophotos," Landscape and Urban Planning (www.sciencedirect.com/science/journal/01692046), Vol. 63, Issue 1, pp. 1-14.; Chester L. Arnold Jr. & C. James Gibbons (1996): Impervious Surface Coverage: The Emergence of a Key Environmental Indicator, Journal of the American Planning Association, 62:2, 243-258; Todd Litman (2010): Evaluating Active Transport Benefits and Costs, Victoria Transport Policy Institute.

12 Office of Transportation and Air Quality, Environmental Protection Agency. (2006). Greenhouse Gas Emissions from the U.S. Transportation Sector: 1990-2003. Report number EPA 420 R 06 003.

13 Federal Highway Administration. (1992). Benefits of Bicycling and Walking to Health.

demonstrate a commitment to healthy transportation options and lifestyles.

SAFETY & HEALTH

In cities where more people begin their commutes to work by walking or bicycling, corresponding fatality rates are generally lower. This is in contrast to critics who fear a higher rate of crashes when more bicyclists and pedestrians are using the existing or future on- and off-street system.¹⁴

Studies show that installing pedestrian and bicycle facilities directly improves safety by reducing the risk of pedestrian-automobile and bicycle-automobile crashes. For example, streets with bike lanes have been shown to be safer not just for bicyclists (compared with no bicycle facilities), but also for pedestrians and motorists.¹⁵ Streets without bicycle facilities may pose a greater collision risk. When walking and bicycling rates double, per-mile pedestrian-motorist collision risk can decrease by as much as 34%.¹⁶

In addition to the safety benefits that occur when more people are walking and bicycling, active transportation can have many positive impacts on personal and community health issues such as diabetes, heart

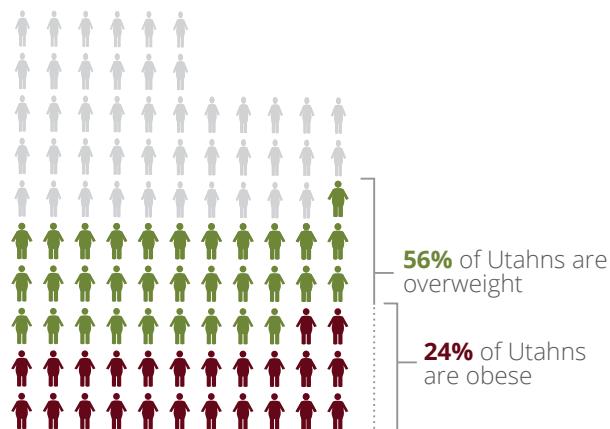


Figure 1.1 Overweight & Obese Population in Utah (Centers for Disease Control, BRFSS, 2013).

14 Alliance for Biking and Walking, Bicycling and Walking in the United States, 2014 Benchmarking Report.

15 Ewing, R. and Dumbaugh, E. (2010). The Built Environment and Traffic Safety: A Review of Empirical Evidence. Injury Prevention 16: 211-212.

16 Jacobson, P. (2003). Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling. Injury Prevention 9: 205-209.

disease, and obesity. In 2013, 7.1% of Utahns were considered diabetic and 24.1% were obese (part of the 56% that were overweight).¹⁷ Although these statistics rate favorably when compared to other states' and national levels, there is room for improvement in Utah communities. States with higher levels of bicycling and walking to work have lower levels of diabetes, obesity, and high blood pressure, and higher percentages of the population meeting recommended weekly physical activity levels.¹⁸

The Centers for Disease Control and Prevention recommend at least 2.5 hours of moderate exercise each week, yet many people do not have convenient access to places where they can be physically active. Walking and bicycling are some of the most basic forms of physical activity. Improving facilities for these activities and linking them to recreational and daily destinations would help better connect people with convenient exercise options.

Studies show that people walk more in safe, walkable, and aesthetically pleasing places. Improved facilities promote physical activity by making walking and bicycling more appealing, easier, and safer.¹⁹

Walking and biking also provide greater social interactions than some other forms of transportation. These interactions may be associated with mental health and social engagement benefits.

With some changes to street designs for bicycling and walking, motorists may be concerned that the possibility for conflict will increase. In reality, many street changes increase safety and comfort for motorists as well as bicyclists and pedestrians. Lane narrowing or reduction often improve driver safety. Providing pedestrian and bicycle facilities also increases predictability in interactions between motorists and those walking or bicycling, thus creating a safer and more comfortable environment for everyone.

17 Trust for American's Health. Key Health Data about Utah (<http://healthyamericans.org/states/?stateid=UT>).

18 Annual Survey Data. Behavioral Risk Factor Surveillance System. Centers for Disease Control, 2011; "2014 Benchmarking Report", p. 70. Alliance for Biking and Walking. <http://bikewalkalliance.org>.

19 Robert Wood Johnson Foundation. Active Transportation: Making the Link from Transportation to Physical Activity and Obesity. Active Living Research. Research Brief; 2009. Available at http://www.activelivingresearch.org/files/ALR_Brief_ActiveTransportation.pdf.

Local Walking & Bicycling Trends

Kaysville has traditionally been a bedroom community: a place where people who work elsewhere live. Only about 1,137 (or 11%) of the 10,247 employed Kaysville residents also work in the city. The remaining 89% leave the city for work everyday, 47% of which commute between 10 and 24 miles south of the city, likely to Downtown Salt Lake City. Of the 7,021 total jobs in Kaysville, the remaining 5,884 (84%) are held by those living outside the city.

Because bicycling and walking trips are typically shorter trips, traditional data sources like the American Community Survey (ACS), which focuses on commute to work trips, do not reflect the real amount of active transportation trips within city limits. Additional survey data that tracks all types of trips regardless of purpose is helpful in a community of Kaysville's size and character.

AMERICAN COMMUNITY SURVEY (ACS) JOURNEY TO WORK DATA

The American Community Survey (ACS) Journey to Work data measures changes in mode share over time. Unfortunately, the ACS only collects information about the main transportation mode for trips from home to work (only 19.6% of all trips made in Davis County, according to the Utah Travel Study) and excludes trips made by those outside of the workforce (including children, retirees, unemployed residents, and stay-at-home parents) and those who commute by different means depending on the day, weather, and time of year. It also excludes trip purposes like shopping, going to and from school, and recreational outings. Capturing non-commute-related bicycling and walking trips is important because of how many Kaysville residents work outside of the city at distances that require considerable effort to travel by foot or by bike. Though useful in many communities (and possibly viable in the future following local increased job growth and local employee recruiting in Kaysville), the American Community Survey's Journey to Work data is not an accurate representation of current or future walking and bicycling activity.

UTAH TRAVEL STUDY

The 2012 Utah Travel Study was a statewide survey and report that contains a wealth of information on statewide and local transportation behaviors, attitudes and trends. The primary tool of the study, the household travel diary, was supplemented by additional surveys including a bicycle and pedestrian barriers survey. Due to plans to reproduce the surveys every 8-10 years, the tremendous amount of valuable data cannot be

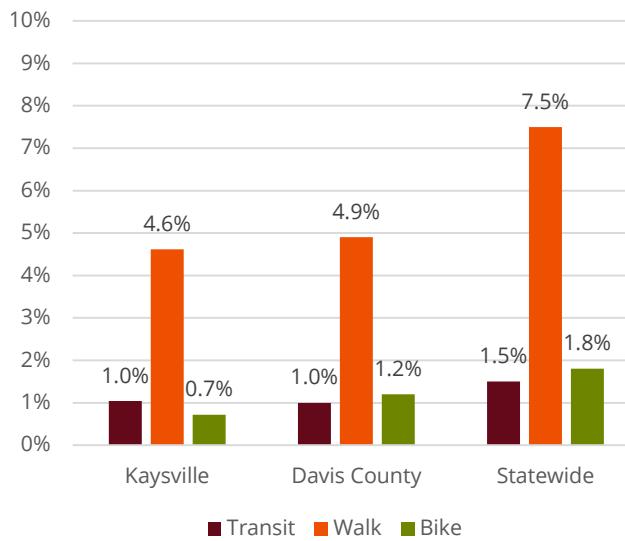


Figure 1.2 Non-Automobile Mode Share (% of Total Trips) in Kaysville, Davis County, and State of Utah (Utah Travel Study)

monitored from year to year (which the ACS can), making tracking incremental progress difficult.

A combined estimated 5.3% of all trips in Kaysville are done by walking and bicycling. As shown in Figure 1.2, walking and bicycling trips in Kaysville are less common than in Davis County and Utah statewide.

Figure 1.3 identifies the most and least common trip purposes in Davis County and shows that "Home to Other" and "Home to School" are the most common walking trip purposes, "Home to Work" and Non-home to Work" are the most common transit trip purposes, and that "Home to Other" and "Home to Work" are the most common bicycling trip purposes. These are trends that do not show up in Figure 1.2.

The analysis zones (AirSage zones) that include Kaysville, 1103 and 1107, and for which the previous data is applicable, also includes Layton, Fruit Heights, and Syracuse. 1103 includes parts of Kaysville east of I-15, and 1107 includes those west of I-15.

Making local, shorter trips (Figure 1.4) to school, recreation, church, transit, and shopping easier will have a greater impact on health, transportation demand, and overall bicycling and walking mode share, rather than focusing predominantly on longer, commute type trips.

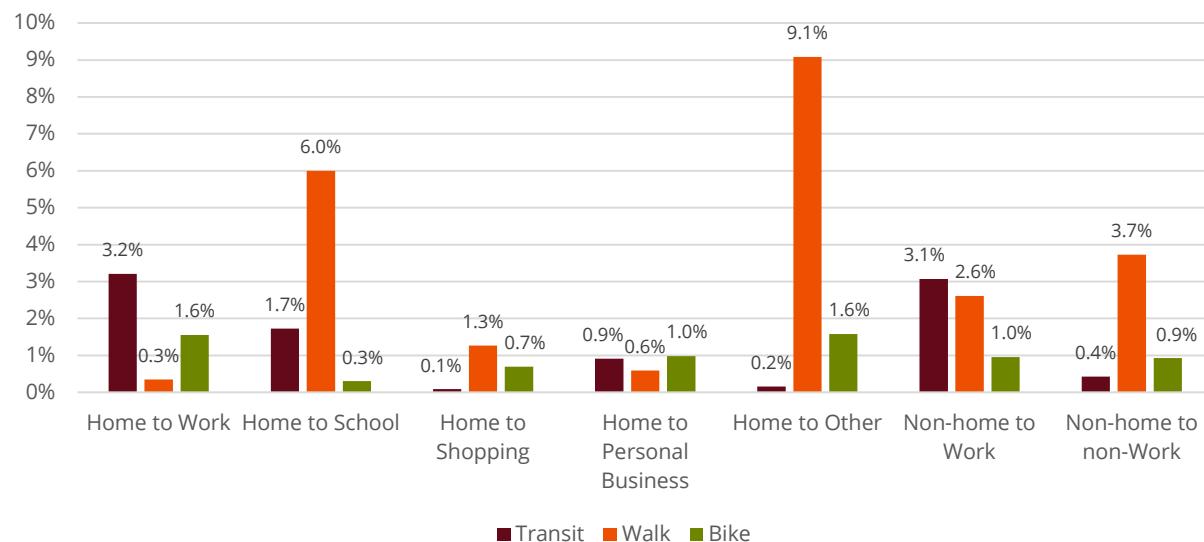


Figure 1.3 Walking, Bicycling, and Transit Trip Purpose Mode Shares in Davis County (Utah Travel Study) Note: Figure 1.3 depicts trip purpose for residents in Davis County, instead of Kaysville, due to the sample size for Kaysville being too small.

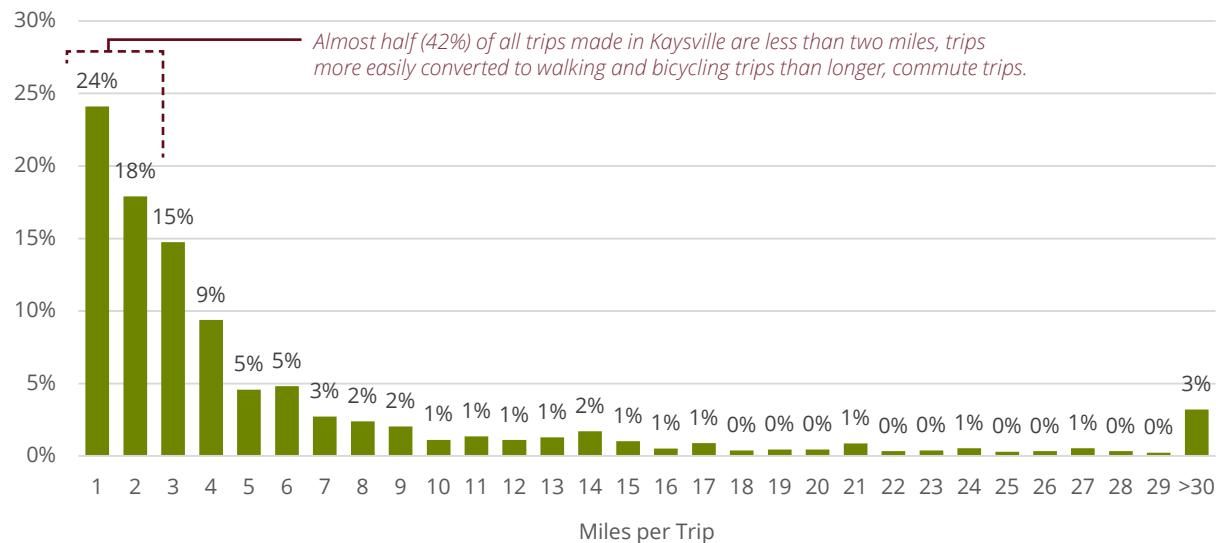


Figure 1.4 Trip Distances in Kaysville (Utah Travel Study)

Some of Kaysville's major destinations, such as Barnes Park, the Library, Kaysville Theater, Heritage Park, Cherry Hill, the D&RG Western Rail Trail, the foothills, and churches, are sometimes partially or completely disconnected from existing or other shared-use paths, bike lanes, sidewalks, and neighborhoods.

Youth Responses

According to the Utah Travel Survey, 20.7% of trips taken by Kaysville and Farmington residents under 16 years old are to school and 60.1% are for recreation, leisure, or unspecified purposes.

National Walking & Bicycling Trends

Kaysville's walking and bicycling mode shares are below national averages. Data collected from the National Household Travel Survey (NHTS) and American Community Survey (ACS) in recent years estimate that out of all trips made in the U.S., regardless of purpose, 1.0% are made by bicycle and 10.4% are by foot. In fact, commute-related bicycling trips in the United States have increased 60% from 2000 to 2012.²⁰ Kaysville is equal to the national average for bicycling, but lower for walking.

Connectivity To Transit

Nearly every transit trip begins as a walking or bicycling trip. According to the Utah Travel Study, 24% of trips in

²⁰ "Benchmarking", 12-13.

Kaysville are one mile or less and 42% are two miles or less (Figure 1.4). The potential for Kaysville residents to ride a bike or walk to take transit, especially within the city, is very good.

FRONTRUNNER COMMUTER RAIL

Kaysville is served by two UTA FrontRunner stations, one in Farmington (450 N 800 W) and one in Layton (150 S Main St). Both stations opened in 2008 as part of the region's first commuter rail corridor between Ogden and Salt Lake City. Farmington's has 874 automobile parking spaces, the most of any station in UTA's system, while Layton's has 383.

Each FrontRunner train is equipped with at least one car that accommodates 9-15 bikes by replacing seats from one side of the car's lower level with bike racks.



UTA's new 15-bike racks on FrontRunner will improve bike stability, avoid damage, and aid in easy removal. They will be tested and implemented in 2016 (Photo: Utah Transit Authority)

Appendix A

Table 1.2 UTA Rail and Bus Routes Serving Kaysville

	Service Type	Frequency	Daily Avg. Boardings	Origin	Terminus	Destinations Served
455	Regional Fixed	Weekday, 30 minutes	1,589	Univ of Utah	Downtown Ogden	Univ of Utah, Downtown, SLC, Lakeview Hospital, Farmington FrontRunner , Hwy 89 , Weber State, Downtown Ogden
456	Minor Regional Fixed	Weekday, 1 Morning (SB) & 1 Evening (NB)	46	Downtown Ogden	North Temple & 1400 West (SLC)	Downtown Ogden, Layton Hills Mall, Farmington FrontRunner , Legacy Pkwy, North Temple
470	Regional Fixed	30 Minutes (Mon-Sat), Hourly (Sun)	3,797	Downtown SLC	Downtown Ogden	State Capitol; Lagoon (Sundays, Summer) ; Kaysville Downtown ; DATC; Layton, Clearfield, and Ogden FrontRunner, Newgate Mall
472	Regional Express	Weekday Morning (SB) and Afternoon (NB) Commutes, 30 Minutes	426	Downtown SLC	Riverdale Park and Ride	Downtown SLC, Kaysville Park and Ride Lot, Layton Hill Mall, Riverdale Park and Ride
473	Regional Express	Weekday Morning (SB) and Afternoon (NB) Commutes, 30 Minutes	645	Univ of Utah	Downtown Ogden	Univ of Utah, Downtown SLC, Farmington FrontRunner , Hwy 89 Park and Ride , Weber State, Ogden FrontRunner and Downtown
477	Minor Local Shuttle	Weekday, 1 Morning (NB) & 1 Evening (SB)	33	Pioneer Adult Rehab Center (PARC)	Center & Orchard (North Salt Lake)	PARC Center, cities between Layton and North Salt Lake
627	Local Fixed	Weekday, Hourly	142	DATC & Davis High School	Weber State Davis Campus	DATC , Davis High School , Downtown Kaysville , Fairfield Jr High , Layton Hills Mall, Weber State Davis Campus
750	FrontRunner Commuter Rail	Weekday, 30 minutes (peak) & 60 minutes (off-peak); Saturday, 60 minutes	488/511* 674/660**	Ogden	Provo	Downtown Ogden, Roy, Clearfield, Farmington FrontRunner , Farmington FrontRunner , Woods Cross, Salt Lake City, points south

Data: Utah Transit Authority

*488 boardings and 511 alightings, on average, throughout the year at the Farmington FrontRunner Station. Usage ranges from about 433/435 in the winter and early spring to about 562/595 in the summer.

**674 boardings and 660 alightings, on average, throughout the year at the Layton FrontRunner Station. Usage ranges from about 650/641 in the winter and early spring to about 696/659 in the summer.

During peak commute hours, these cars are usually filled beyond capacity with bicycles.

Farmington's FrontRunner station can be accessed on foot or by bike via Legacy Parkway Trail, Burke Lane, and the D&RG Western Rail Trail on the north, but a small gap exists between both trails on Burke Lane. Arterial and collector roads surrounding the station do not have bike lanes or paths, and Park Lane to the north does not have sidewalks or shoulders, limiting active transportation connectivity to the station from the

southern parts of Kaysville. The station is also served by bus routes 455, 456, and 473 (Express), routes that also serve the rest of the city, improving connections for those choosing not to or those without the option to drive.

Layton's FrontRunner station can be accessed on foot by using the sidewalks on the north side of Layton Parkway, but they are not as comfortable as a separated path of a landscaping-buffered sidewalk. There are on-street bike lanes on Layton Parkway west

of the I-15 interchange and FrontRunner station, but a small gap exists on Main St between the bike lanes and the station. There is limited active transportation connectivity to the station from the northern parts of Kaysville. The station is also served by bus route 470, which also serves the rest of the city, improving connections for those choosing not to, or those without the option to drive.

BUSES

Kaysville is served by two Park and Ride lots, one located at 200 North & Highway 89 (in Fruit Heights city limits and served by routes 455 and 473) and the other at 160 N & 600 West by the Kaysville I-15 exit (served by routes 456 and 472). These lots allow transit users or carpoolers to park for free and take transit to their destination. This helps reduce the number of cars on I-15 and makes the first and last miles of transit trips easier, especially for those who live too far away to ride a bike or walk.

Remaining bus routes that serve Kaysville, but do not stop at either FrontRunner station or either Park and Ride lot, are routes 477 and 627. All busses serving the Kaysville area accommodate bicycles in a front-mounted rack that will fit either 2 or 3 bikes, depending on the model. Trips that begin and/or end by bike can be linked with transit. Other bus route information, including average daily boardings (usage), is found in Table 1.2.

Improving access to and from bus stops and transit stations, making it possible to take a bicycle with you on



UTA's busses accommodate 2-3 bikes, depending on the route
(Photo: Utah Transit Authority)

the bus, and providing secure bike parking at stops or stations, among other improvements, will allow transit users to comfortably ride a bike or walk the first or last mile of a transit-centered trip, making transit more attractive and feasible for people in Kaysville.

Existing Plans & Studies

The Kaysville Active Transportation Plan will require coordination with many departments and stakeholders to actively promote increased bicycling and walking within the city and improve connections to regional destinations. As such, coordination with different planning efforts is necessary to take advantage of opportunities to share resources and leverage greater community value out of future projects.

A review of relevant, existing documents also helps to understand the City's overall vision, planning history, limitations, and direction found in existing codes and policies. With a clear understanding of this planning context, the Kaysville Active Transportation Plan seeks to develop compatible and coordinated goals and recommendations.

KAYSVILLE GENERAL PLAN

One of the general goals and policies of the 2014 General Plan update states that Kaysville will preserve and strengthen personal safety and security, provide public safety and education, and promote activities that meet community standards. The Plan states that one of the ways that the City Center (the area of Main St and 200 North from I-15 to Fairfield Road) should be developed as a traditional main street is by connecting all uses and individual sites for pedestrian, as well as vehicular, access.

Under the title "Recreation", the General Plan states that the City should provide a wide variety of accessible, developed and undeveloped recreation lands, including trails, forests, parks, and recreation centers. School providers, such as private entities, charter schools, and Davis School District, are encouraged to locate schools on appropriate sites and streets that emphasize safety and access.

Transportation and Traffic Circulation

The General Plan states that Kaysville as a whole benefits by supporting active transportation routes and trails, which have an “increasing role of transporting people throughout the city.” Kaysville City participates in the Wasatch Front Regional Council’s (WFRC) Active Transportation Committee and supports their planning efforts. Routes that have been proposed by WFRC, the General Plan states, should be categorized per the City Council’s recommendation.

Some of the goals and policies in the Transportation and Traffic Circulation section of the General Plan support walking and bicycling:

- Design and develop streets to encourage traffic speeds that are appropriate for adjacent land uses
- Bicycle facilities should be provided
- The Kaysville Active Transportation Plan (this plan) should be not only adopted, but implemented as well
- All streets in the city should be designed and developed to accommodate bicycles in accordance with AASHTO’s Guide for the Development of Bicycle Facilities
- Main Street from Farmington to Layton (which should include signage and markings applicable for the highest level of “shared roadway”) and the Denver & Rio Grande Western Rail Trail should be designated as north-south bicycle routes
- 200 North (from Denver & Rio Grande Western Rail Trail to US-89) and Burton Lane (from Denver & Rio Grande Western Rail Trail to Main Street) should be designated as east-west bicycle routes
- Public bicycling facilities should be provided in parks and open spaces
- The City should encourage owners to provide bicycle facilities with public access on private property

KAYSVILLE IMPACT FEE FACILITIES PLAN

The City created this multi-faceted plan in 2012 to address water, power, streets, recreation, and police. The sections on streets and recreation are relevant to the Kaysville Active Transportation plan.

Streets (Tab 3)

The purpose of the 2012 update to the Streets Capital Facilities Plan (previous version dated back to 2004) is to “facilitate the construction of a quality roadway system that will provide improved [roadway] facilities as needs arise.” All proposed improvements in this section cost approximately \$20 million (2012 dollars).

There are project-specific costs, funding sources, and additional information associated with each proposed improvement project and this information should be referenced in conjunction with development of recommendations from the Active Transportation Plan. This plan’s recommendations (found in Chapter 4) took into account locations, time frames, and details of the improvements from the Impact Fee Facilities Plan’s Streets section, including recommended, new signalized intersections.

Suggested changes to the Streets section upon next revision are also made in the policy section of Chapter 4 in this plan.

Recreation (Tab 4)

This section’s standards state that there shall be recreation facilities within ten minutes travel time of residences, though the mode of travel is not specified (i.e. ten minutes walking is closer than ten minutes driving). The plan also clarifies that the Utah Transit Authority owns the Denver & Rio Grande (D&RG) Western Rail Trail.

KAYSVILLE CITY TRAFFIC CALMING PROCEDURES

The Kaysville City Council adopted a traffic calming procedures guide in late 2015 in order to “further the safety of the citizens of Kaysville City by reducing the overall speed of traffic and by reducing the use of minor streets for through traffic.” The principles outlined in this document are perfectly in line with the Active Transportation, especially when it comes to creating more livable streets and improving safety for vulnerable users.

The document is not a standard, but rather a procedural way to implement traffic calming when requested by Kaysville residents. The public request process, which

includes applications, traffic counts and studies, and police action, is outlined in Sections 3 and 4.

Traffic calming measures include speed humps, speed tables, chicanes, lateral shifts, chokers, neckdowns (or curb extensions), median barriers (or islands), traffic circles, roundabouts, realigned intersections, half closures, and full closures. Many of these traffic calming measures are also included in *Appendix A: Design Guidelines* in this plan.

BURTON LANE ROAD DEDICATION

Utah State University owns the Utah Agricultural Experiment Station at Kaysville Research Farm north of Burton Lane, east of 50 West, and west of Main St. It has dedicated part of the south side of its property, which is also on the north side the Burton Lane right-of-way from 315 East to Main Street, to the City with the understanding that it will be used as a bicycling and walking connection along the north side of the road and that there will not be a vegetated park strip to maintain. Preliminary design should begin in late 2015 and construction in 2016.

WEST DAVIS CORRIDOR INITIAL PLANS AND EIS

The Utah Department of Transportation (UDOT) plans to construct a new, four-lane divided highway that

would function as the northern extension of Legacy Parkway (which currently ends at Park Lane) that will be called the West Davis Corridor. The purpose of the corridor is to reduce user delay on the existing system due to an ever-growing population and, therefore, more cars on the road in the future. It will act as a parallel, alternative route to I-15 on the west sides of Kaysville and Farmington skirting the Great Salt Lake, extending from Farmington on the south to West Haven in Weber County on the north. In its current design phase, UDOT does not have plans to include a bicycle and pedestrian trail or other active transportation facilities along the corridor north of Farmington.

There are several design alternatives for the southern end of the West Davis Corridor that would affect Kaysville and Farmington, namely, two interchange options that would connect to either Shepard Lane or Glovers Lane. The Shepard Lane option (Figure 1.5) poses significant connectivity challenges for bicyclists and pedestrians, especially those that are traveling east and west. This option provides a work around route under the interchange for the D&RG Western Rail Trail, the only existing off-street, shared-use connection in the area. The Environmental Impact Statement (EIS) acknowledged the need to purchase homes, affect

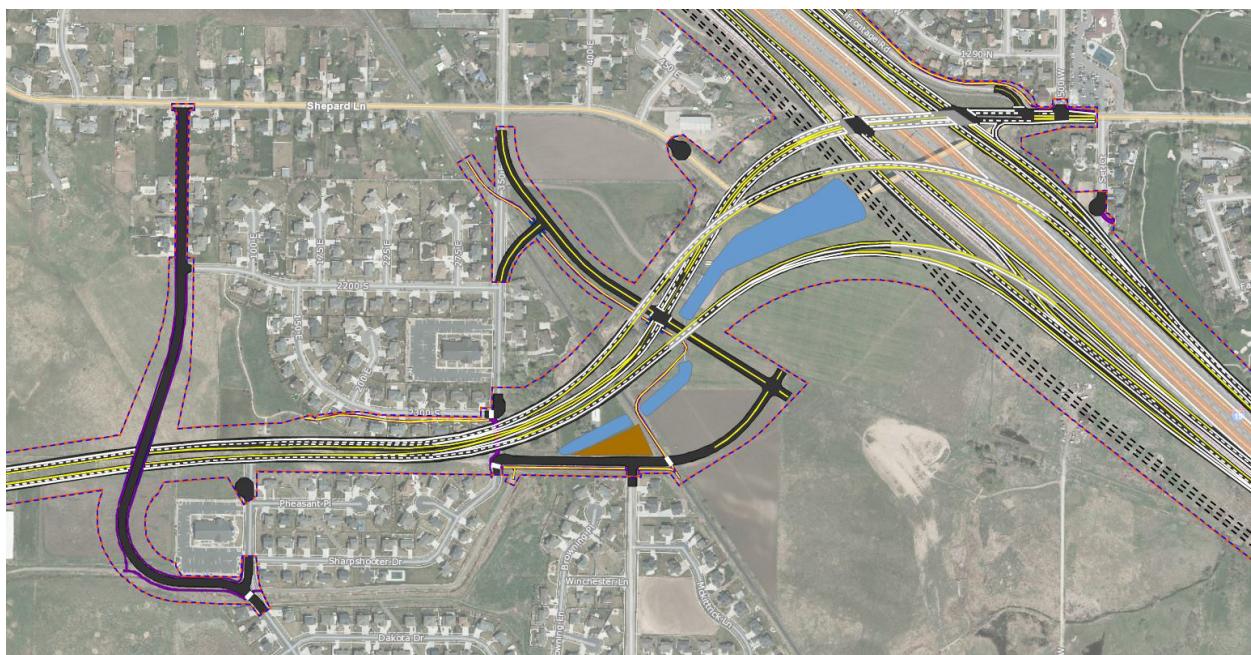


Figure 1.5 West Davis Corridor's Shepard Lane Interchange Design Option (UDOT)

sensitive lands and habitats, and that the corridor would bisect communities and affect access to parks, schools, and homes.

There are several environmental, governmental, and citizen groups that either completely or partially oppose UDOT's plans for a new highway. They are asking for different levels of mitigation, from more access and facilities for bicyclists and pedestrians to a no-build alternative.

UTAH COLLABORATIVE ACTIVE TRANSPORTATION STUDY (UCATS)

UCATS developed a regional, active transportation resource and infrastructure master plan that enhances and coordinates pedestrian and bicycle connectivity. It lays the groundwork for an urban network of bicycle routes (UCATS Regional Bicycle Network) throughout the Wasatch Front and recommends pedestrian connections to transit within one mile of UTA's TRAX and FrontRunner stations.

UCATS Area 5: Fort Lane/Main Street Bike Lanes: Layton, Kaysville, Farmington and UDOT

The proposed facility in UCATS Area 5 connects to two FrontRunner stations (Layton and Farmington), and accommodates bicyclists and pedestrians over major interchanges on US-89, Legacy Parkway, and I-15. It creates a north-south regional link east of I-15, where facilities are currently limited. The proposed route would extend from the Layton FrontRunner station along Gentile Street to Fort Lane and Main Street, then south on Main Street to Farmington's Park Lane, and finally connect to the Lagoon Frontage Road from Park Lane.

WFRC 2015-2040 REGIONAL BASE TRANSPORTATION AND PRIORITY BIKE ROUTES PLANS

These plans address the existing and anticipated future bicycling and walking network and routes in Salt Lake, Tooele, Davis, Morgan, Box Elder, and Weber Counties. The planning effort is divided into two plans: a 2015-2040 Bicycle Base Network, which includes all local and county plans, and a 2015-2040 Regional Priority Bicycle Network, which is based on the findings and recommendations in the UCATS study. The studies

also include bicycle compatibility index (BCI) and bicycle level of service (BLOS) scores that indicate the perceived comfort and suitability of all major roadways in the area.

UDOT STATE BICYCLE PLAN AND REGION 1 BIKE PLAN

The State Bicycle Plan (2014) is composed of separate bike plans from each of the four regions in Utah. The Plan focuses mostly on gaps on state routes throughout the Wasatch Front region, and represents the initial efforts of what will become a more comprehensive plan that will eventually comprise many different types of UDOT facilities in both urban and rural parts of Utah. The Region 1 Bike Plan, which includes Farmington and Kaysville, recommends "planned bicycle network" facilities on the following roadways, which are currently identified as gaps or barriers to bicycling because of road width, truck traffic, traffic speed and volumes, etc.:

- 200 N (I-15 to Main St)
- Main St (200 N to US-89 by Cherry Hill)
- Main St and 200 E (Shepard Lane to Chase Ln in Centerville)
- Park Lane (Main St to I-15)
- State St (400 W to Main St)

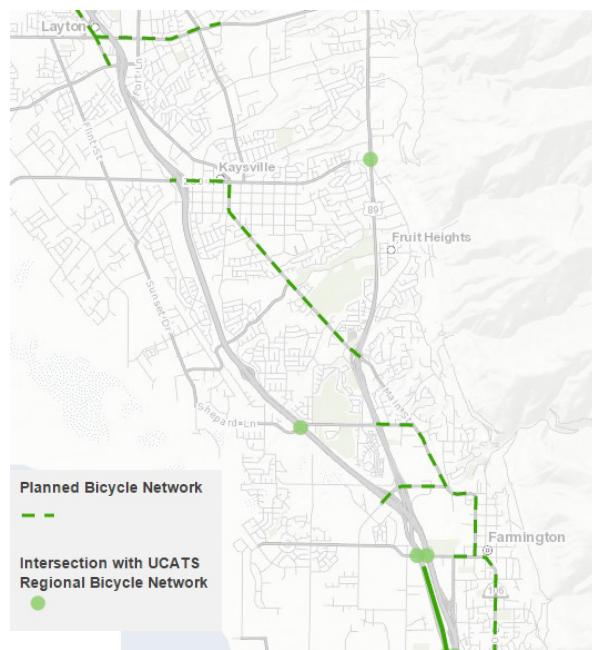


Figure 1.6 Region 1 Bike Plan Map (Kaysville and Farmington)

DAVIS COUNTY TRAILS MASTER PLAN

In 2004, Davis County created a countywide trails master plan in order to improve trails coordination between jurisdictions and to, hopefully, provide recreation and alternative transportation routes, as well as access to open spaces, wildlife habitats, and natural areas.

The Plan identifies, defines, and gives background about regionally significant trails. Some of the information is now out of date, but the developmental history of these trails is important. The regional trails identified in the plan are: the Bonneville Shoreline Trail, Denver & Rio Grande (D&RG) Western Rail Trail, Legacy Parkway Trail, Kays Creek Parkway Trail, Farmington Creek Trail, Jordan River Parkway Trail, Emigrant Trail, Power Line Trail, Weber River Parkway, Davis & Weber Canal Trail, Farmington Bay Waterfowl Management Area Trails, and Antelope Island Trails. Most of these are located or are important to bicycling and walking connectivity in Farmington or Kaysville.

The Davis County Online Trails Map lists the following bicycle trail classes or types and locations:

- Class 1 – May be paved or unpaved, could have steep grades, and can be shared with pedestrians (or, Shared Use Path)
- Class 2 – Striped or signed lane for one-way bike travel on a street, usually one with a wider shoulder to accommodate the bicycle lane (or, Bike Lane)
- Class 3 – Signs designate the route for bicycle travel on a roadway shared with motor vehicles (or, Shared Roadway or Bike Route)
- Proposed Bike Routes – Routes that will potentially be Class 2 (Bike Lane) or 3 (Shared) facilities. Routes are proposed on most major streets in Kaysville and Farmington, including 200 N, Main St, Fairfield St, Shepard Ln, 200 E, State St, Clark Ln and Grovers Ln (east of the D&RG Western Rail Trail), and Frontage Rd (south of Grovers Ln).

DAVIS COUNTY COMMUNITY HEALTH IMPROVEMENT PLAN (2014-2018)

The Davis County Health Department convened partners in 2013 to identify Davis County's health improvement priorities, mobilize partners to address the priorities, and prepare a community-wide health improvement strategic plan. Davis County health priorities that were selected are: Suicide, Obesity, Access to Mental & Behavioral Health Services, and Air Quality. The five year Davis County Community Health Improvement Plan, also known as the CHIP, is an important tool in public health to bring community partners together to strategically align to address community health priorities. Active transportation is a significant strategy included in the plan because of the physical activity, air quality, and mental health benefits which crosscut all priorities.

Asset and Gap Analysis

Davis County is the top-ranked county in Utah for sidewalk connectivity. Only 7% of Davis County residents report that there are no sidewalks in their neighborhood. Statewide, 18% of residents report no sidewalks. While most residents have sidewalks, 41% of residents in Davis County would like more sidewalks. While sidewalks and trails are strengths in the communities in Davis County, there are gaps that have been identified that prevent active transportation.

Identified weaknesses include: very limited on-street bike lanes, lack of neighborhood connectivity, unsafe routes to schools, few bicycle or pedestrian paths across freeways, highways, overpasses, and rail lines to access shopping and entertainment, few bike racks, and difficulty accessing public transportation on foot or by bike.

Strategies to combat these identified deficiencies include:

- Fun, free and safe physical activity opportunities for families
- Active transportation options that are accessible and affordable for all users

- Transportation and land-use policies that provide opportunities for all people to be active and engaged in their communities
- A Complete Streets approach, where streets are designed and operated to enable safe access for all users
- Expansion of Safe Routes to School programs, which encourage children to walk and bike to school safely
- Incentives for transportation and transit projects that promote health

The Plan seeks to:

- Increase the number and quality of bike lanes
- Improve connectivity between neighborhoods
- Improve connectivity of non-auto paths and trails
- Encourage communities to adopt the Utah Bicycle and Pedestrian Master Plan Design Guide
- Improve and promote Safe Routes to School plans
- Improve active transportation connections to transit
- Improve walkability index to Frontrunner stations
- Increase transit pass incentive programs
- Reduce percentage of Davis County workforce that commutes alone
- Increase percentage of Davis County residents who use public transportation to commute to work

UTA FIRST MILE-LAST MILE STUDY

This goal of this study is to provide meaningful and comfortable connections to UTA FrontRunner and TRAX stations in order to make transit use easier and more accessible, especially to those without access to an automobile. Existing UTA strategies include shuttles, active transportation, wayfinding, car share, bike share (GREENbike), and on-board bicycle accommodations.

The study identified walk access to the Farmington and Layton FrontRunner stations as "medium". They classified in the "auto-dependent" stations group, or in other words, those with low to medium walk access, low walking and bicycling rates, and a large number of automobile parking spaces. Strategies to improve the walkability and bikeability to these "auto-dependent" stations include:

- Wayfinding and information
- Bicycle network improvements
- Access connections
- Pedestrian network improvements
- Crossing treatments

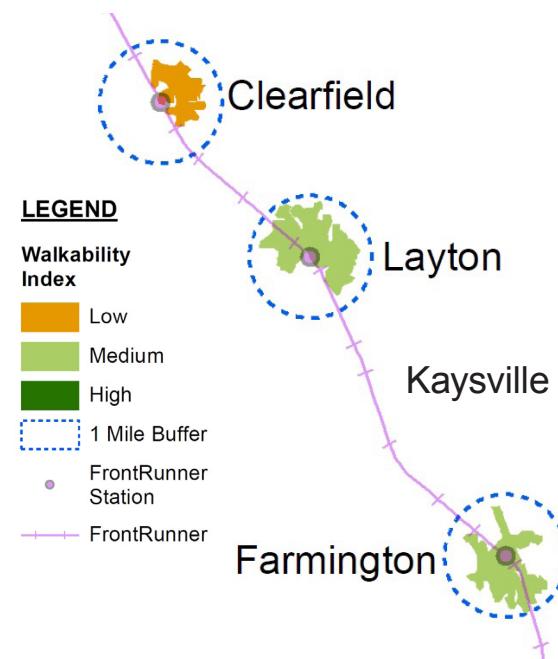
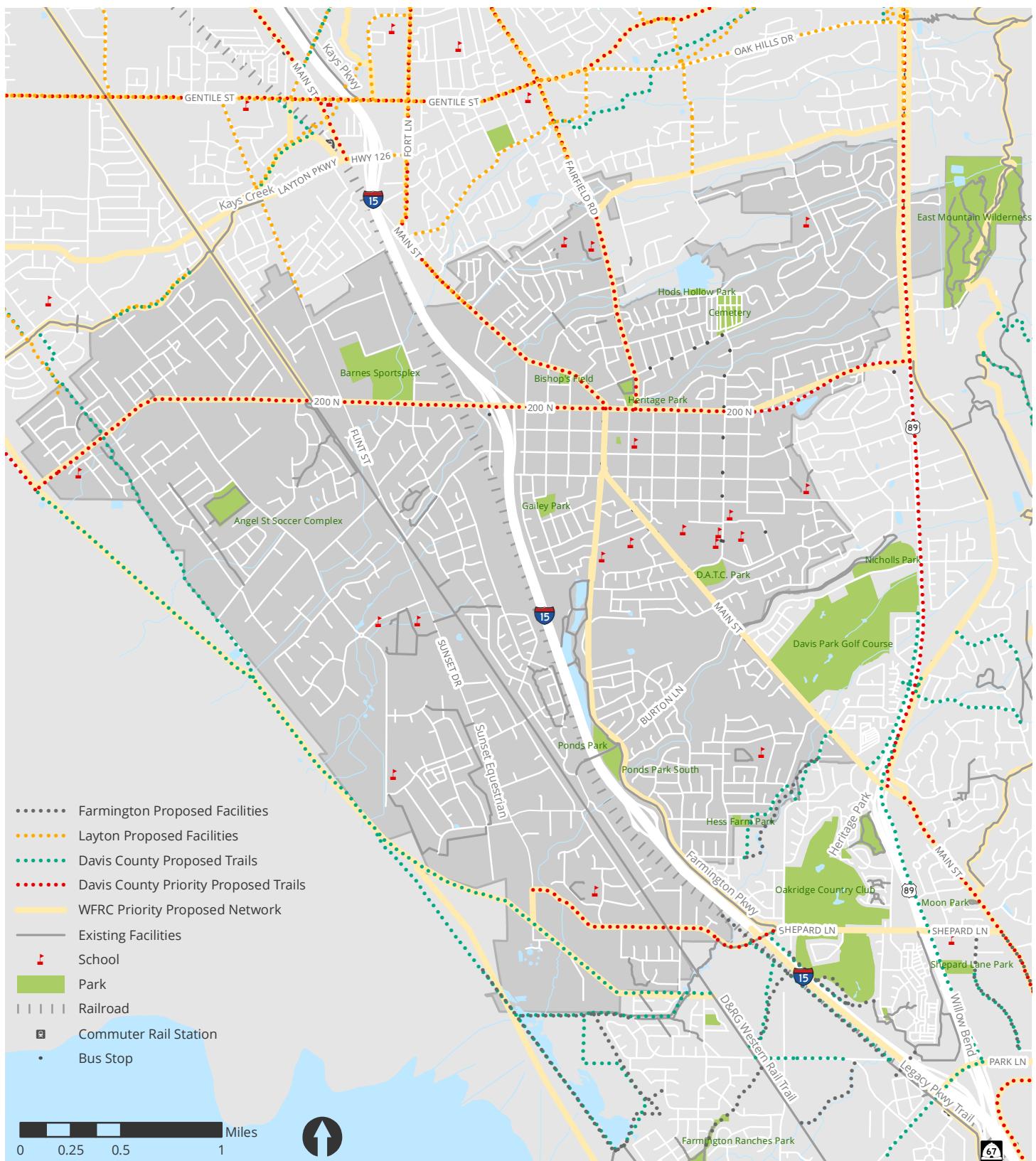


Figure 1.6 Walk Access at Local Transit Stations

Appendix A

Figure 1.8: Kaysville Previously Planned Facilities Map



Existing Codes & Policies

CITY CODE

Responsibility for the regular maintenance and repair of sidewalks, including replacing sidewalks that are broken, have cracks, or are lifting up due to tree roots, rests with the home or property owners (when on, adjacent to, or affected by their property) and not with the City (Title 9, Section 9-2-10, subsection 2).

Zoning Ordinance (Title 17)

Sidewalks are only required on one side of the street in the Old Kaysville Townsite (R-T) zone. Enhancements like street lights, decorative poles, and signs designating this area as the Old Kaysville Townsite will add to its distinctive look (Chapter 11).

The off-street parking facilities in the Professional Business (PB), Central Commercial, and General Commercial (GC) Districts must ensure compatibility of vehicular and pedestrian circulation and site plans and clearly illustrate all existing and proposed vehicular and pedestrian paths. Additionally, all conditional uses must provide for safe circulation of vehicles and pedestrians (Chapter 30).

Chapter 32 identifies off-street parking requirements and some requirements to improve pedestrian access to and through these areas. At least ten square feet of landscaping for each parking space (i.e. 100 parking spaces = 1,000 sq ft of landscaping) shall be provided within all off-street parking areas (i.e. parking lots). These may provide shade for pedestrians walking between their cars and their destinations and can be used to provide walkways through parking areas.

Conceptual plans, preliminary subdivision plats, and applications for Planned Residential Developments must include vehicular and pedestrian circulation including pedestrian and bicycle paths and trail systems (Chapter 34).

Manufactured home parks are required to be located adjacent to an arterial or collector street, which are often more dangerous for bicyclists and pedestrians than residential streets. These are typically not streets where schools are sited. This increases the distance

and hazard that children living in the manufactured home parks must travel to and from school. Within home parks, internal sidewalks are required to be 36" or three (3) feet wide, one foot narrower than the City's standard in other areas of the city (Chapter 35).

Building Regulations and Subdivisions (Titles 18 and 19, respectively)

Sidewalks are required in General Commercial, Central Commercial, Health Care, and residential subdivisions, and as specified by City Engineer in Light Industrial, Public Use, and Professional Business Zones. Sidewalks shall be four feet (4') wide or five feet (5') wide as determined by City Engineer and four inches (4") thick (six inches (6") at driveways to prevent cracking).

Existing Programs & Events

STUDENT NEIGHBORHOOD ACCESS PROGRAM (SNAP)

SNAP is a statewide program, part of the federal Safe Routes to School (SRTS) program administered through the Federal Highway Administration (FHWA). The goal of the program is to educate children about walking and biking to school safely and encouraging them to use these modes. The program also seeks to construct or improve walking and bicycling infrastructure near schools and associated homes. It provides additional resources for students, parents, teachers, and administrators, including tips, ideas, walking school bus

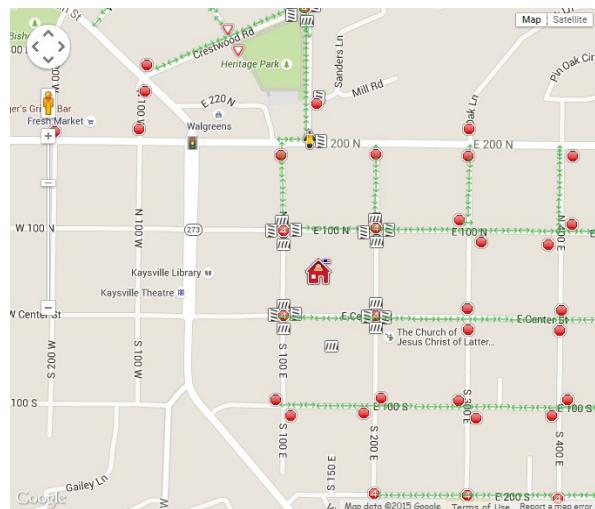


Figure 1.9 SNAP Map for Kaysville Elementary

apps, Walk n' Roll programs, crossing guard standards, activity books, and more.

Most elementary and junior high schools attended by children who live in Kaysville have a SNAP plan for the area of the city that is served by that particular school. A SNAP plan is an online map and accompanying resources that show parents and students the safest way to get to school by walking or bicycling, crosswalks, signals, crossing guard locations, and student drop-off and pick-up areas.

Schools that are attended by Kaysville students that do not currently have SNAP plans are: Creekside Elementary and Davis High.

WALK MORE IN FOUR

From August 31st to September 25th, 2015, students are invited to compete in the Walk More in Four 2015 competition that encourages them to walk and bike safely to school (or, if walking and biking to school are not possible because of distance, safely riding and walking in their neighborhoods) at least three days each week with the chance to win prizes and an overall statewide competition. The school with the highest percentage of students completing the challenge will be eligible for a \$500 prize to be used by the school's Safety Committee and a traveling trophy awarded each year.

DAVIS HIGH SCHOOL AND FARMINGTON JUNIOR HIGH DEVELOPMENT MOUNTAIN BIKE TEAMS

Davis High School's mountain bike team is part of the Utah High School Cycling League and the Nation Interscholastic Cycling Association (NICA), which develop mountain biking programs for student-athletes in Utah. Teams and races promote athletic as well as leadership skills. Mountain biking has been a club sport at the high school level in Utah since the 2012-13 school year.

Beginning in 2014, 7th and 8th graders at junior highs began racing in development teams. As of the beginning of the 2015-16 school year, more than 300 junior high athletes compete the day before the more than 1,000 high school athletes during several weekends in the



Davis High School's Mountain Bike Team (Photo: UtahMTB.com)

fall. The Farmington Junior High Development Team is open to all interested students from other schools; Farmington Junior is the only junior high in Kaysville and Farmington with such a team.

NATIONAL TRAILS DAY

On June 6, 2015, Kaysville Parks and Recreation and Biker's Edge bike shop hosted a local celebration of National Trails Day, beginning at the D&RG Western Rail Trail & Webb Lane (near Flint Street) that encouraged people to walk, run, bike, and enjoy the trails in Kaysville.

PEDAL AWAY PARKINSON'S

An annual bike ride benefiting the Utah Chapter of the American Parkinson Disease Association is held in July at Gailey Park. In 2015, more than 300 registered riders raised \$20,000 for Parkinson's disease research and local programs.

UTAH CYCLOCROSS SERIES

The Utah Cyclocross Series holds one or two races every year, usually in fall or winter, at Barnes Park. Cyclocross races consist of laps of a one to two mile course between 30 minutes and an hour long, featuring different surfaces like grass, snow, sand, mud, and pavements.

ROTARY CLUB 4TH OF JULY RUNNING RACES

The Kaysville Rotary Club has held annual running races, most notably the 5K, every 4th of July for several decades. Proceeds from the races benefit the Rotary Club and fund service projects throughout the year.

MONSTER MASH & DASH

There is an annual Halloween-themed 5K race that runs along the cemetery, encouraging people to be active while celebrating the upcoming seasonal holiday. Other activities include pumpkin painting and carving, scarecrow and pie eating contests, storytelling, and games.

PEDESTRIAN SAFETY AWARENESS & GREEN RIBBON MONTH

September is Green Ribbon Month, a campaign that focuses on pedestrian safety, especially near schools. Davis County Safe Kids Coalition started Green Ribbon Month for pedestrian safety awareness in 1998 and has since expanded to schools throughout the state with more than 72,000 people participated in 2005. The goal of the awareness campaign is to display green ribbons on cars, at schools, on fences, etc., in order to promote protecting children while walking to school, especially in crosswalks and school zones. The pledge includes pedestrian safety assemblies, walkability audits, poster contests, decorating schools, driving slow in school zones and residential areas, and walking school buses. Green Ribbon Month concludes with International Walk to School Day, usually held during the first week in October.

UDOT SAFE SIDEWALK PROGRAM

Any sidewalk, pedestrian facility, or pedestrian safety devices that are located in urban areas and adjacent to a state highway or route will be included in all state highway engineering and planning projects. These projects also require a 25% local government match.

Appendix A

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Attendees at the beginning of the public open house at the Kaysville Library

2: Public Involvement

In order to determine the needs of current and possible bicycling and walking users, multiple public outreach efforts were conducted in Kaysville and Farmington during the course of the development of this Plan in order to better understand the needs of people who live, work, and recreate here. In total, more than 1,500 people from both communities participated during the Plan. Suggestions made and discussions had during the public involvement process heavily influenced recommendations made throughout this plan.

Field Investigation Bike Ride

Several members of the project steering committee rode through Farmington and Kaysville on August 21, 2015, in order to ground-truth existing data and identify and discuss highlights and deficiencies in the overall walking and bicycling system.

Interactive Online Mapping Tool

This tool, which allowed users to draw routes they liked or those they thought needed improvement, mark where their typical destinations are, and where they saw gaps in the system or barriers that discouraged them from walking and bicycling more, received responses

from nearly 300 unique users. They drew 109 lines describing roads, paths, and sidewalks that they used and/or that needed improvement and 453 points that they identified as either destinations, gaps, or barriers. All responses identifying gaps and barriers can be seen in Figure 3.7 and destinations can be seen in Figure 3.8.

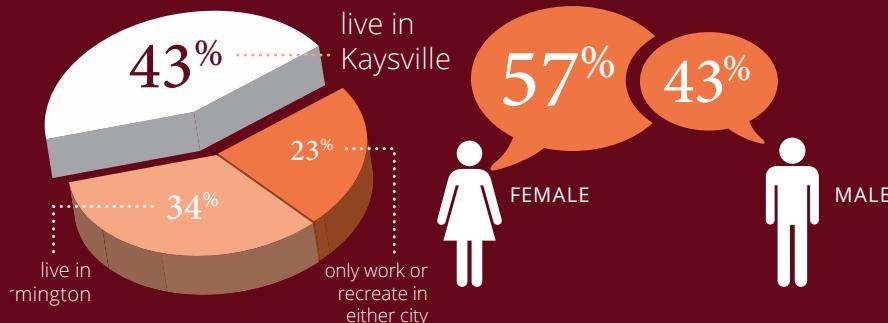
Online Public Survey

A 17-question online survey about bicycling and walking habits and preferences was conducted between August 15 and September 30, 2015. The survey was promoted via all of the City's official social media outlets, on the marquee at City Hall, in Facebook groups and on personal pages, and via email to stakeholders, City staff, survey respondents, and interested parties. 43% of the more than 1,000 respondents lived in Kaysville, 34% in Farmington, and the remainder worked or recreates in either or both.

Joint Community Survey Results for Kaysville

1,023

Total number of survey respondents



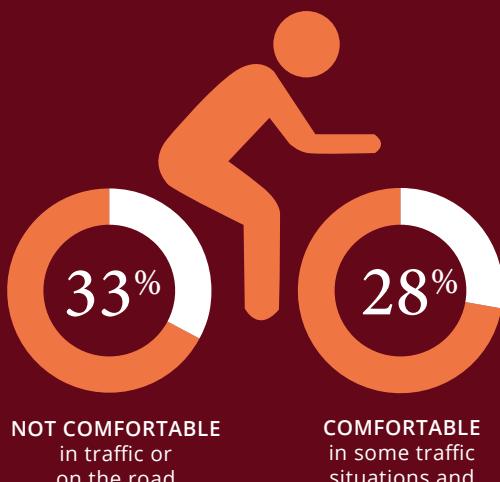
OVERALL WALKING & BIKING CONDITIONS

Walking and bicycling conditions are currently rated, on average, between fair and good



85%
feel comfortable or very comfortable walking

The most common type of person is one that is **not comfortable in traffic and will only ride a bicycle on paths and quiet residential streets.**



36-45

YEAR OLDS

Most common age group (36%)

Respondents were interested most in walking & bicycling to



PARKS (78%)



TRAILS & PATHS (78%)



FRIENDS & FAMILY (51%)



SCHOOL (41%)



SHOPPING (34%)

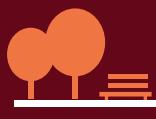
Top priorities for investment:



IMPROVE PATHS &
TRAILS NETWORK
73%



ADD
ON-STREET
BIKEWAYS
52%



MORE SIDEWALKS,
SHADE TREES
& LANDSCAPING
45%



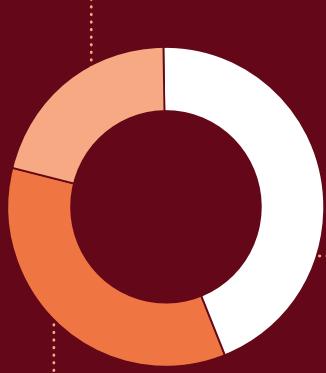
BETTER
CROSSINGS
27%



ACCESS TO
TRANSIT
(FrontRunner
& Buses)
25%

WALK & BIKE HABITS

Out of respondents with children:



35% have kids who **sometimes** walk or bike to school or friend's houses

21%

have children who **do not** walk or bike to school or friend's houses

44%

have kids who **always** walk or bike to school or friend's houses

Since 1969, the percentage of children walking or bicycling to school in the United States has dropped from 50% to 13%.



Public transit use is much higher when the trip begins with walking or biking



Lack of safe crossings, high motor vehicle speeds, and too much traffic were the most cited reasons that their kids did not walk and bike more.

ADDITIONAL COMMENTS



WEST ← → EAST

282

ADDITIONAL COMMENTS

By far, the number one recommendation is **making east-to-west connections safer and more abundant**, especially around Park Lane, FrontRunner, and Station Park

Public Open House

About 250 people attended the public open house on December 8, 2015, at the new Kaysville Library, where they learned about the Plan's purpose and the City's vision and goals for the future of walking and bicycling, and were encouraged to review and provide feedback on initial recommendations made by the project team, including consultants and Farmington and Kaysville staff. It was one of the best-attended open houses for a bicycling and walking plan in Utah, regardless of the size of the community.

The open house was advertised at grocery stores, library branches, on the City website and monthly utility bills, through the Davis School District Peachjar mailing list received by all parents of students in Kaysville, as well as through email to interested stakeholders and community members, on Facebook, and on other social media platforms. The open house was another opportunity, in addition to the survey and interactive mapping tool, for the public to draw desired routes and connections on maps, express wishes to the project team and City representatives, and shape walking and bicycling for the future in Farmington and Kaysville.

Some of the same, recurring themes from the survey and interactive map were evident in the open house as well, like improving bicycling and walking connections across I-15 and Highway 89; safety generally; access to and from Station Park and Farmington FrontRunner via Park Lane; bicycling and walking safety and comfort on and across 200 N (especially near I-15), Main St, and 200 E; maintenance, especially ridding trails of thorns and other weeds; and filling small gaps in the existing network with facilities comfortable enough for any user; and, providing comfortable facilities, including paths, separated bike lanes, and grade-separated crossings.



Open house attendees included residents of all ages, including this young group



Project team members spoke with the public, listened to concerns, and assisted them in drawing desired improvements on the maps provided



Attendees were greeted with bicycling and walking-themed treats as they left the open house



Paved path connecting a neighborhood to Angel St Soccer Complex

3: Existing System & Needs Analysis

This chapter discusses the existing system of shared-use paths, unpaved trails, bike lanes, and shared lanes/roadways in Kaysville. It also includes an analysis of needs and gaps in the system; barriers to walking and bicycling; and crashes involving bicyclists and pedestrians, including the conditions that can contribute to crashes.

Kaysville currently has about 18 total miles of bikeways and paved and unpaved shared-use facilities within city limits. Many more miles of bicycling, walking, and hiking facilities are available to the east, in the foothills outside of the city, to the south in Farmington, and to the north in Layton (see map of existing system in Figure 3.3).

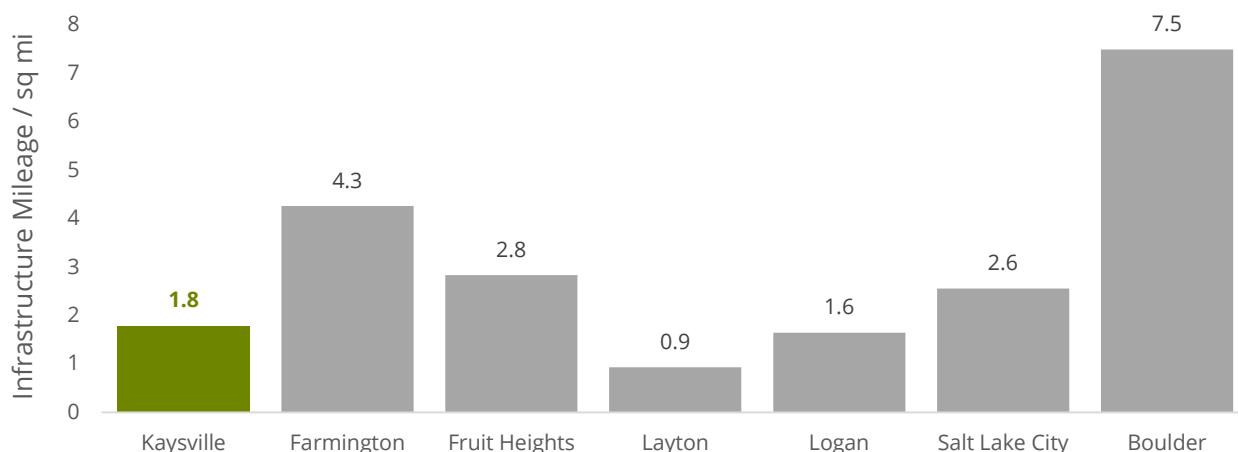


Figure 3.2 Existing infrastructure density (total system mileage / square miles of incorporated city) in Kaysville compared to Farmington and Fruit Heights, other surrounding communities in Utah, and Boulder, CO, one of the most bicycle friendly communities in the Western United States. The city's infrastructure density is lower than some other cities in Utah (but higher than Layton).

Shared-Use Paths

There are nearly 13 miles of shared-use paths in Kaysville. These paved paths, sometimes called trails, are shared by all non-motorized modes. They are typically located in their own rights of way separated from roads, but can also be adjacent to roads. They can be short connectors or longer, regional facilities. One of Kaysville's notable paths is the D&RG Western Rail Trail, which makes up the majority of the mileage in the city.



The Denver & Rio Grande (D&RG) Western Rail Trail shared-use path near Shepard Ln

Unpaved Trails

There are more than 5 miles of unpaved mountain biking and hiking trails inside Kaysville city limits and many more miles outside of, yet accessible from, the city. Unpaved trails can be dirt, gravel, crushed limestone, and other natural surfaces, and exist in separate rights of way for exclusive use by pedestrians, mountain bikers, and equestrians. Unpaved trails can be singletrack such as the Bonneville Shoreline Trail or the trails in the East Mountain Wilderness Park, or wider and more accessible soft-surface trails.



Unpaved trails in the East Mountain Wilderness Park in northeastern Kaysville, east of US-89

Bike Lanes

Although there are not currently any existing bike lanes in Kaysville, this type of bikeway is present in Farmington and Layton. It uses striping, symbols, and sometimes signage to assign space on the road to bicyclists. Bike lanes encourage predictable movements by both bicyclists and motorists by assigning each mode separate spaces.



Bike lane on State Street at about 300 West in Farmington

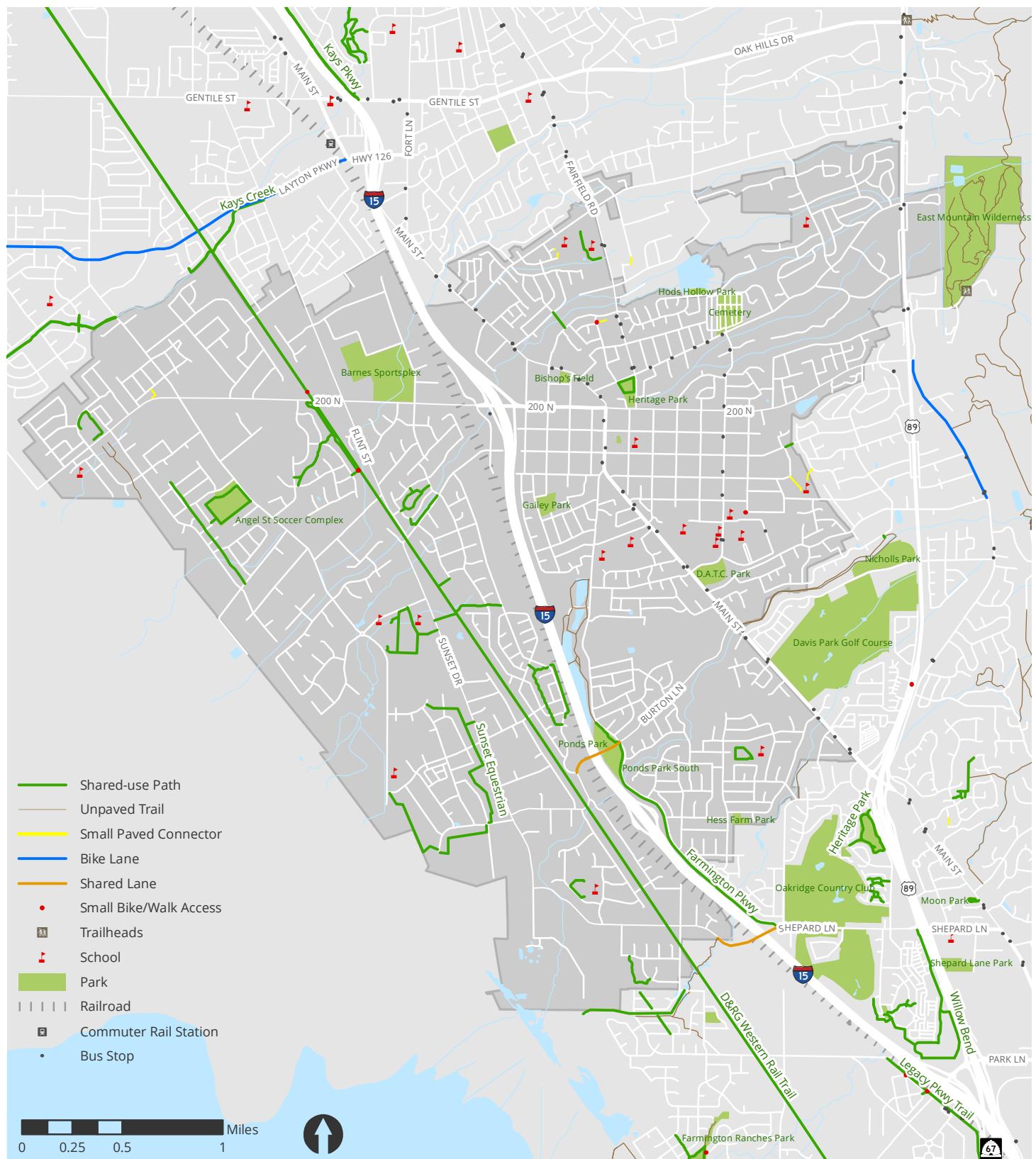
Shared Lanes/Roadways

Roadways that highlight the legal right of bicyclists and cars to operate within the same travel lane, either side by side or in single file depending on roadway configuration, are called shared roadways. They can be identified by signage and/or pavement markings. There are 0.3 miles of signed shared roadways in Kaysville; the Burton Lane overpass over I-15 has "Bicycles May Use Full Lane" signage on both approaches that alert motorists that bicyclists may potentially be using the travel lane due to constrained roadway width and lack of a dedicated bicycle facility.



Shared roadway and "Bicycles May Use Full Lane" signage on Burton Lane over I-15

Figure 3.3: Kaysville Existing Bicycling & Walking Facilities Map



Crashes

Crash data is an important statistic in tracking and analyzing bicycle and pedestrian safety. The Utah Department of Transportation supplied data for all crashes in the state involving bicyclists or pedestrians since 2006.

NATIONAL AND STATEWIDE TRENDS

Overall traffic fatalities have decreased by 19% in Utah since 1975 and fatalities per 100 million miles traveled have decreased by 76%. This means that even though there are many more Utahns driving now than in 1975, the raw number of fatalities has actually decreased.¹

In recent years, the number of bicyclist fatalities in crashes has also decreased overall in the United States (2014 was the only year that had a small and temporary uptick), particularly for bicyclists under 16 years old and those in larger cities and communities that have increased investment in bicycle facilities.²

Utah is the 14th safest place to walk (0.97 pedestrian fatalities per 100,000 population) according to a National Highway Traffic Safety Administration (NHTSA) report about traffic safety trends in 2013.³ Nationally, pedestrian crash and fatality rates have decreased dramatically as walking rates have increased.⁴

CRASH LOCATIONS

As seen in Figure 3.5, crashes of any type, but particularly those causing more serious injury, are clustered around state routes like Main St and 200 N; intersections; and higher speed, wider roads, like Hwy 89 and the I-15 interchange. Even though more crashes have occurred in Kaysville than in Farmington, for example, fatal and incapacitating crashes are more common in surrounding communities.

FACTORS CONTRIBUTING TO HIGH FREQUENCY

There are several factors in traffic safety data that identify potential causes or influences in pedestrian and bicyclist crashes. According to the NHTSA, these factors include (in order) failure to yield right of way

¹ *Traffic Safety Facts 2013*. 2015. Washington, DC: National Highway Traffic Safety Administration.

² Ibid.

³ Ibid.

⁴ "Benchmarking", 85.



5 INCAPACITATING OR FATAL INJURIES DUE TO THESE 80 CRASHES (6%)

9% OCCURRED WHEN IT WAS DARK OUTSIDE	20% OCCURRED WHEN IT WAS DARK OUTSIDE
86% OCCURRED AT INTERSECTIONS	60% OCCURRED AT INTERSECTIONS
26% CAUSED BY ROAD GEOMETRY (GRADE, BLIND CURVE, ETC.)	22% CAUSED BY ROAD GEOMETRY (GRADE, BLIND CURVE, ETC.)
INVOLVED A 26% TEENAGED DRIVER (8.4% OF KAYSVILLE IS TEENAGED)	INVOLVED A 31% TEENAGED DRIVER (8.4% OF KAYSVILLE IS TEENAGED)

HOWEVER, CRASHES IN KAYSVILLE WERE LESS LIKELY TO INVOLVE A DISTRACTED DRIVER THAN THOSE IN FARMINGTON

WHERE DO CRASHES OCCUR?

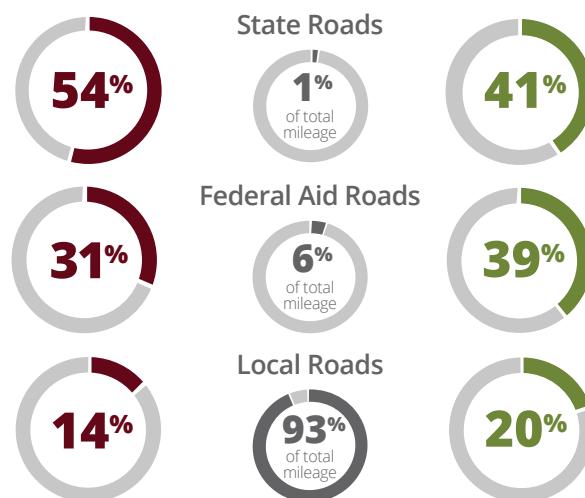
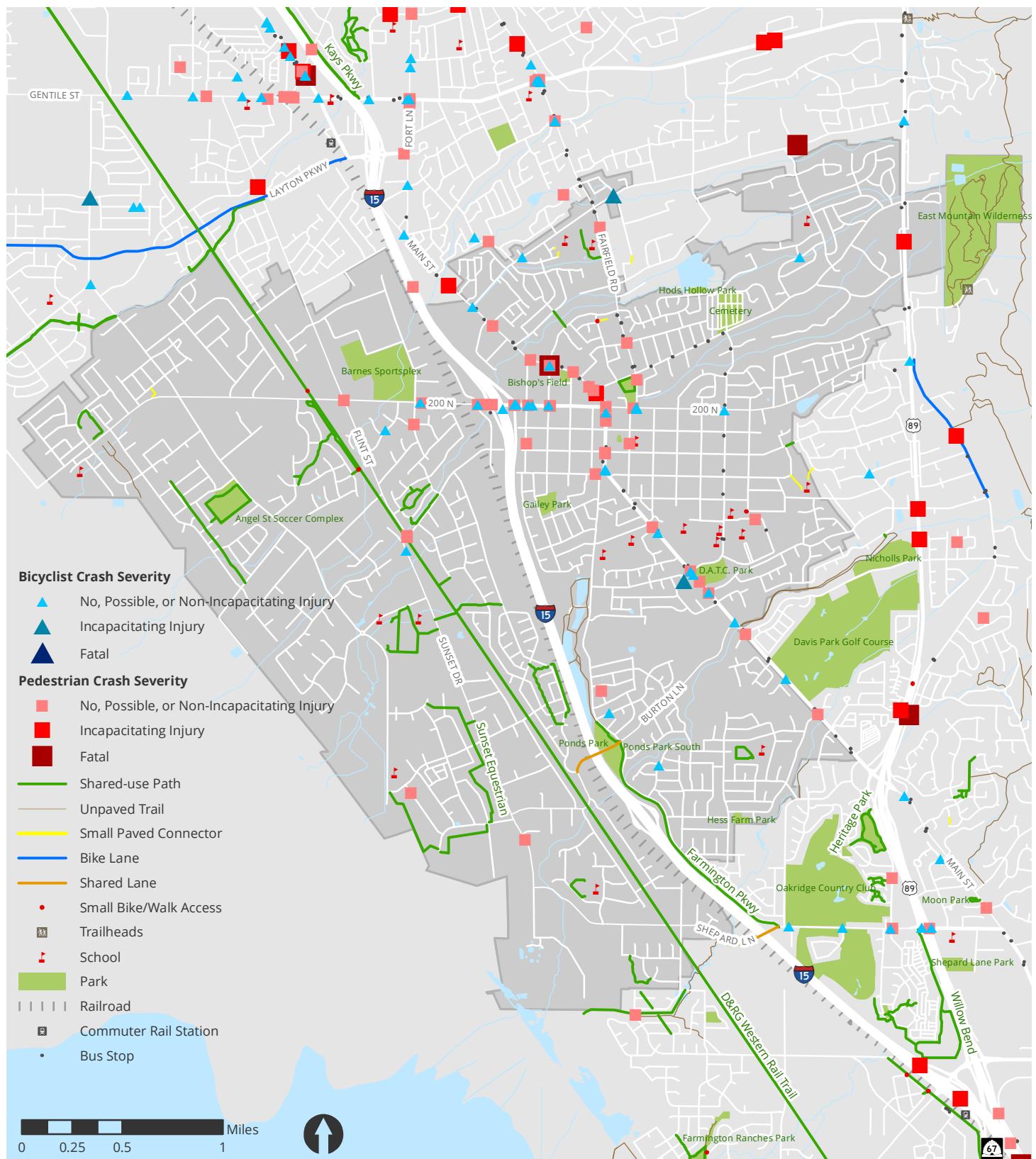


Figure 3.4 Graphic analysis of crashes involving bicyclists and pedestrians in Kaysville (2006-2015) (Data: UDOT). Even though there were 80 bicyclist and pedestrian-involved crashes between 2006 and 2015, there were more than 3,000 motorist-only crashes. The purpose of this analysis is not to highlight the risk of riding or walking. Rather, it is to identify the places and factors that contributed to crashes in an effort to remedy them.

(by either party), improperly in roadway, not visible, improper crossing of roadway or intersection, under the influence, and darting or running into the road.⁵

⁵ *Traffic*. 2015.

Figure 3.5: Kaysville Crash and Safety Analysis Map



Trends specific to Kaysville are described in these sections.

Alcohol & Speed

Although 37% of traffic fatalities in Utah involved a driver with a blood alcohol concentration (BAC) above the legal limit (.08)⁶, it was not a trend in Kaysville's data.

Additionally, even though 34% of traffic fatalities in Utah were speeding-related, excessive speed was not a significant trend in the crashes in Kaysville.

Needs, Gaps, Opportunities, & Constraints

EXISTING SYSTEM GAPS & NEEDS

Although the existing bicycling and walking system in Kaysville is good, gaps and needs still exist (Figure 3.8), many of which will be addressed in this plan, thereby improving connectivity and usability of on and off-street facilities.

OPPORTUNITIES & CONSTRAINTS

Opportunities identified in Figure 3.8 differ from gaps because they are opportunities for development of facilities (i.e. an easement through a property or between two properties, parks, available and unused right of way that could be used for a new facility) that are not necessarily missing segments. Constraints can be natural features (like rivers, streams, and mountains or steep grades), freeways, other busy roads, and railroad tracks. Many of the constraints in Figure 3.8 were identified by the public as barriers during this plan's public involvement process as well as in the Utah Travel Study's Barriers and Hazards Survey.

Demand, Origin, & Destination Analysis

While Figure 3.8 shows desired routes and existing gaps, opportunities, and other location-specific public comments about improvements that can or should be made, Figure 3.9 shows where the major destinations are located in Kaysville, those that draw or could potentially draw the most amount of bicycling and walking traffic. Improving connectivity to and within these destinations is a priority.

⁶ *Traffic*. 2015.

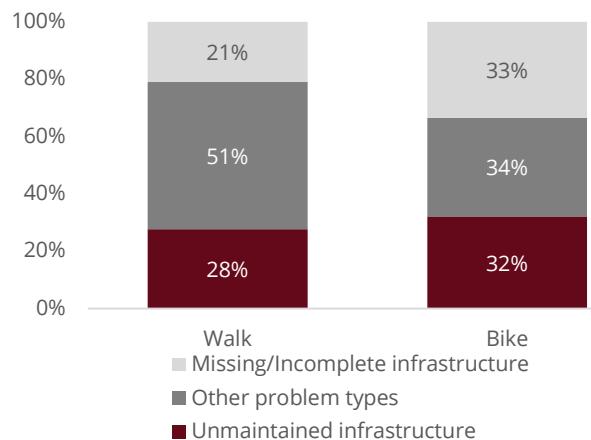


Figure 3.6 Types of walking and bicycling barriers identified in the Utah Travel Study (Note: Responses were very similar to the type of barriers identified in the interactive mapping tool (Ch 2))

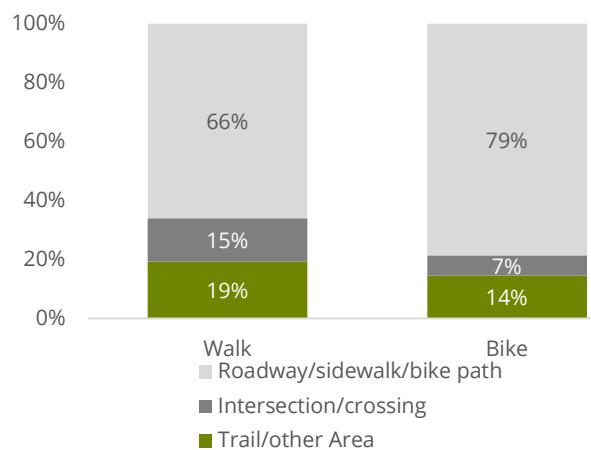


Figure 3.7 Location of walking and bicycling barriers identified in the Utah Travel Study. Most barriers were located on a roadway, sidewalk, or path



Some members of the public suggested a path along Bair Creek near Burton Lane and Nicholls Road, but constraints, especially near and under I-15, make a continuous project more difficult

Appendix A

Figure 3.8: Kaysville Needs, Gaps, Opportunities, & Constraints Map

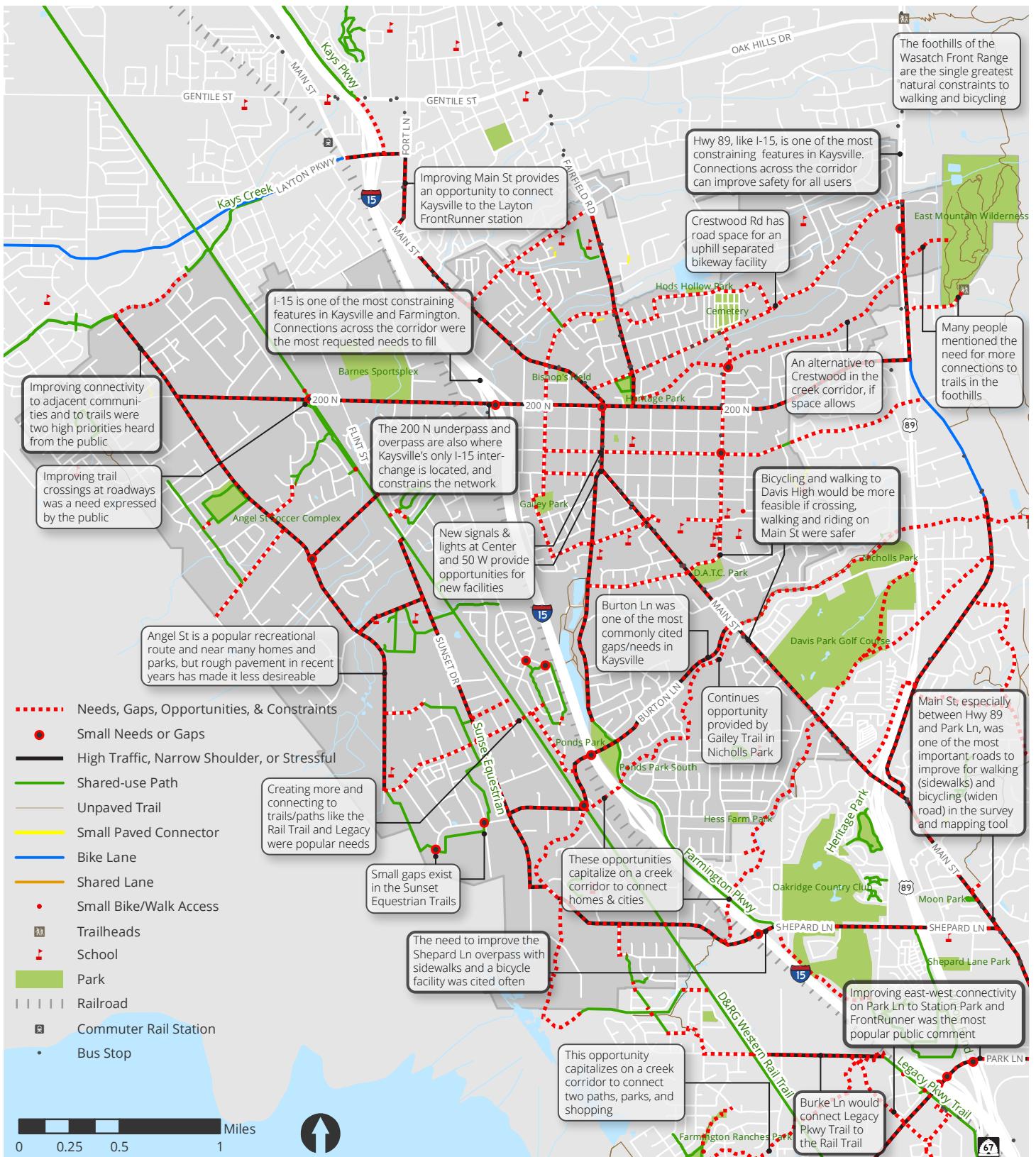
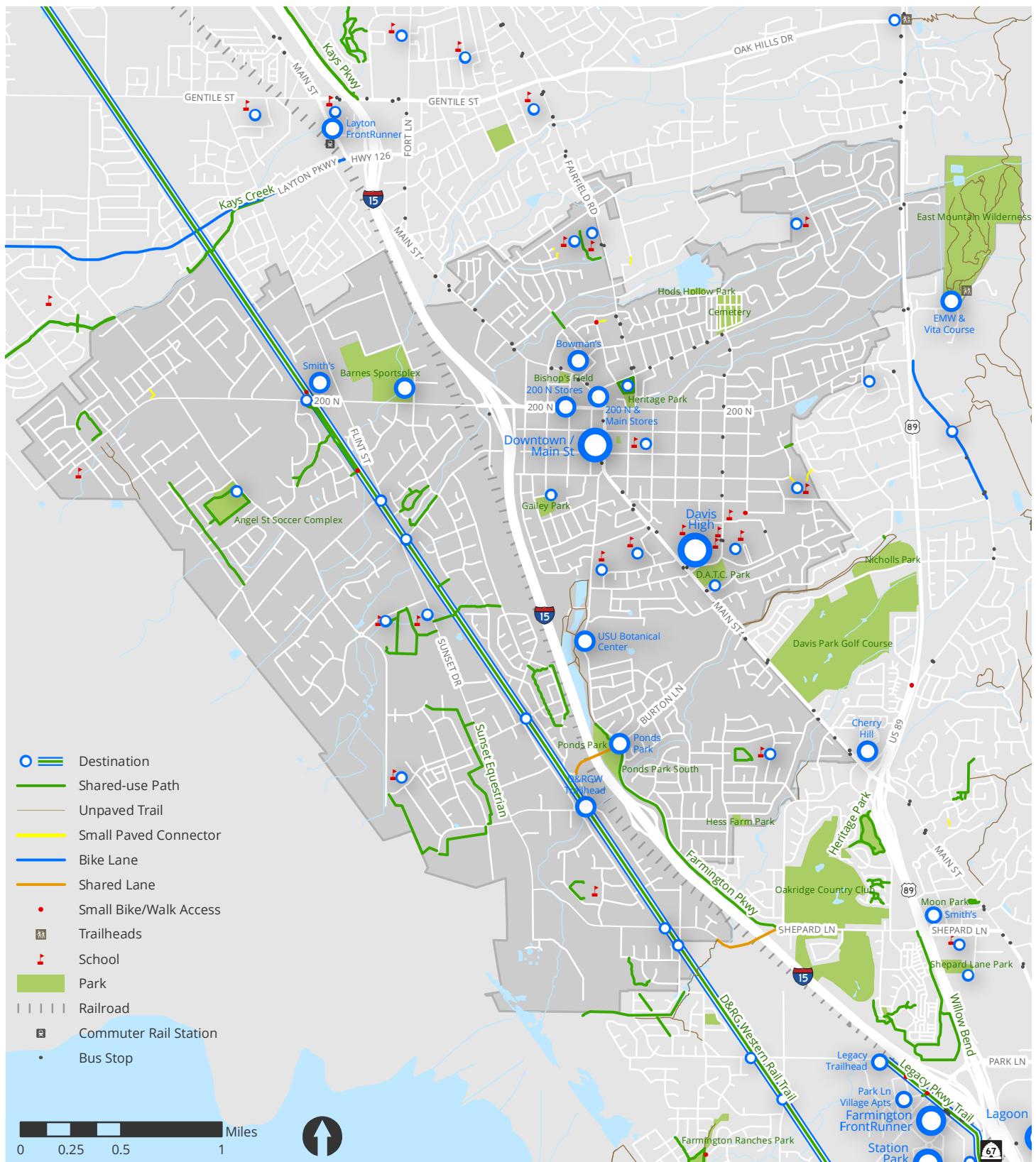


Figure 3.9: Kaysville Demand, Origin, & Destination Map





Recommended improvements included in this chapter will build on the existing trail and path network

4: Recommended Improvements

Introduction

People who walk and ride bicycles vary in their physical abilities, experience levels, and level of comfort near traffic much more so than drivers of motor vehicles do. Well-designed streets and dedicated, off-street facilities should be planned and implemented in a way that accommodates these different types of people walking and riding. Many streets, such as low speed, low volume local streets, may not need special facilities to accommodate active transportation users, while others with higher volumes and speeds may require significant infrastructure investments.

This plan's proposed active transportation system seeks to provide people in Kaysville viable, convenient, safe, and healthy active transportation choices. The proposed system also enhances regional connectivity by linking Kaysville to other communities.

Development of Recommended Improvements

Community goals, identity, and input were the primary considerations in the development of the recommended improvements in this chapter and in the plan overall. Input from both Kaysville City and Farmington City, the Utah Department of Transportation, and the project steering committee also offered clarification on project statuses, costs, implementation criteria, and future plans. Additional coordination will be needed to implement facilities in corridors owned by outside agencies or private land owners, along boundaries with adjacent cities, and near schools. Additionally, the recommendations in this plan represent a master planning level of detail. They are subject to change and refinement as conditions and development patterns change and as individual projects are implemented. Complex projects, such as recommended bicycle and pedestrian crossings over I-15, will require feasibility studies.

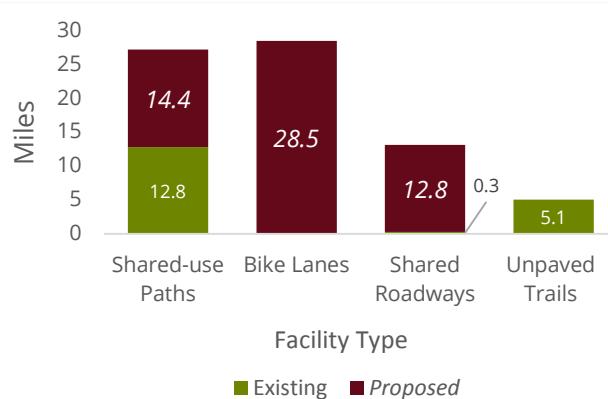


Figure 4.1 Mileage of Existing and Proposed Facilities in Kaysville City Limits by Facility Group Type (Note: To date, Kaysville and regional partners have invested primarily in off-street facilities like paths and trails, but not as much in on-street facilities)

Appendix A

Figure 4.2: Kaysville Recommended Improvements Map



Public Survey Respondents' Top Priorities for Investment



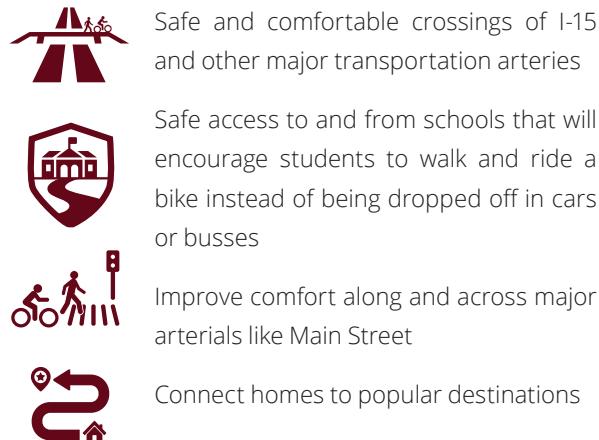
PROJECT GOALS

The following plan goals (identified at the beginning of the plan and repeated here) were instrumental in developing the recommendations in this chapter:

- Increase economic development opportunities for current and future residents, business owners, and stakeholders
- Plan, design, and maintain a walking and bicycling network that is visible, attractive, and convenient for all users, regardless of age or ability, especially commuters and driving-age students
- Unite the east and west, especially across US-89, I-15, and Legacy Parkway, with bicycle and pedestrian improvements that are safe enough to feel comfortable riding with a young child
- Improve overall connectivity and accessibility for bicyclists and pedestrians, including access to and from neighborhoods, services, public facilities, schools, shopping, food, entertainment, and transit
- Improve the safety and livability of the community by addressing and fixing deficiencies in on-street corridors and intersections
- Ensure equitable access so that all children can safely walk and bike to school

COMMUNITY PRIORITIES

Priorities and themes gleaned from the thousands of residents from both cities who participated in the public involvement process, summarized in Chapter 2, that are not included in the top priorities for investment included above, were a driving force behind the plan's recommendations:



Kaysville residents' principal goal for this plan is to improve existing and adding new **connections between the west and east side of the City that are comfortable for all users**, especially at 200 North and Burton Lane; and at Park Lane, the FrontRunner Station, and Station Park in Farmington. Even though the distance between existing facilities, destinations, and neighborhoods on either side of I-15 may be only about 1/4 of a mile, distances feel much longer as the level of traffic stress increases and comfort decreases.

LOW-STRESS BICYCLE AND PEDESTRIAN FACILITIES

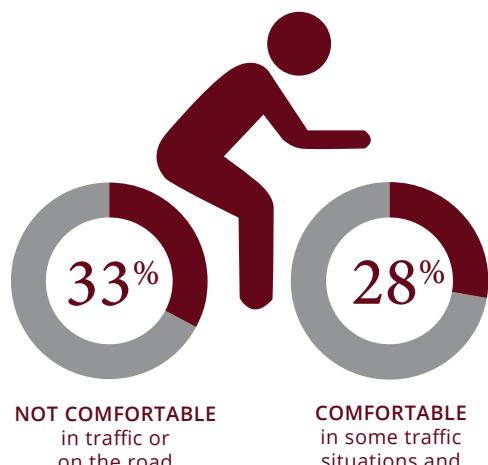
Low stress bicycle and pedestrian facilities, like shared-use paths, trails, separated bike lanes, and bicycle boulevards, appeal to a more diverse cross section of the public than conventional, on-street, paint-only facilities like bike lanes. They are low-stress because of increased physical protection or separation from traffic; use of low volume, low speed streets (bicycle boulevards); and/or directional wayfinding signage that directs users to destinations and specific routes like interstate highway signage does for automobiles.

A majority of the public would like to walk or ride bicycles more but are discouraged from doing so by perceived safety concerns, lack of facilities, or a lack of knowledge about where the appropriate facilities are located. Surveys nationally show that 50-60% of people say they would ride a bicycle more (or start riding) if they had access to facilities that provided more separation from traffic, lower traffic speeds, and/or lower traffic volumes. Public input indicated a strong demand for more paths and trails, and on-street facilities that provided that same level of comfort but with greater connectivity to destinations.

Separated or traffic-calmed on-street facilities like separated bike lanes or bicycle boulevards, respectively, also create a better pedestrian experience by reducing traffic speeds or, in the case of separated bike lanes, increasing the distance and physical separation between sidewalks and active motor vehicle travel lanes. Additionally, evidence has shown that increasing the number of bicyclists on the road improves safety for everyone. Cities with high bicycling rates tend to have lower crash rates.¹

¹ Marshall, W., and N. Garrick, 2011 - Evidence on why bike-friendly cities are safer for all road users, *Environmental Practice*, 13, 1

The most common type of person surveyed in Kaysville and Farmington (33%) is one that is **not comfortable in traffic and will only ride a bicycle on paths and quiet residential streets.**



Recommendation Categories

Overall recommendations were classified into three categories:

- **Off-street** (shared-use paths, unpaved trails, and sidewalks)
- **Spot improvements** (intersection and crossing improvements, signals and beacons, grade-separated crossings, traffic calming, end-of-trip facilities)
- **On-street** (bike lanes, buffered bike lanes, separated bike lanes, and bicycle boulevards)

Although brief descriptions and graphics for each recommended facility type are included in this chapter, more specific guidelines on location selection, widths, implementation, and design considerations are found in *Appendix A: Design Guidelines*.

Off-Street Recommendations

SHARED-USE PATHS

Shared-use paths, as discussed in Chapter 3, are facilities separated or buffered from roadways for use by bicyclists, pedestrians, and other non-motorized users (i.e. D&RGW Rail Trail). They are frequently found in separate rights-of-way along railroads, utility corridors, parks, and waterways, but can also exist within street or highway rights-of-way with adequate separation (called sidepaths). Due to their proximity to traffic, this latter type require additional safety considerations, especially at intersections and driveways.



The Denver & Rio Grande Western (D&RGW) Rail Trail is popular with people walking, running, and riding bicycles, especially families (Photo: Shaunna Burbidge)

West Davis Corridor

The establishment of a new highway on the west side of Davis County, known as the West Davis Corridor, beginning at Grovers Lane in Farmington, is not guaranteed. However, recommendation of a regional shared-use path within the highway right-of-way, like Legacy Parkway Trail, is within this plan.

Years ago, initial conversations between cities and UDOT produced a less than hopeful outlook for including the path along with highway construction. However, most of the previous concerns over each City maintaining their own section have since been alleviated due to their experience maintaining the Legacy Parkway Trail and the D&RGW Rail Trail.

If the West Davis Corridor project does not move forward and if Davis County cities do not implement a stand-alone path, linear and spot recommendations pertaining to the corridor should be reconsidered.

UNPAVED TRAILS

Unpaved trails (dirt, gravel, crushed limestone) are completely separated rights-of-way for exclusive use by bicyclists, hikers, pedestrians and, in some cases, equestrian uses. Unpaved trails can take the form of singletrack trails like the Bonneville Shoreline Trail, or wider, more accessible and multi-modal soft-surface trails.

SIDEWALKS

Although not all missing sidewalks were identified as future improvement projects, sidewalks, especially near schools, identified by the public, each City, and the project steering committee are included in the recommendations of this plan.

Spot Improvements

Many of the recommended improvements in this plan are classified as spot improvements, or recommended fixes specific to one location, like a traffic signal, crosswalk, curb ramp, roundabout improvement, bridge, or tunnel. These improvements will refine the existing system as well as help users navigate the proposed system more easily.

GRADE-SEPARATED CROSSINGS

Tunnels

Tunnels, or undercrossings, are grade-separated crossings for bicyclists and pedestrians, especially useful when crossing streets that have high volumes and/or high speeds. They are more easily implemented when the street(s) to cross are at a higher elevation than the facility going under. Special considerations for cost-benefit, lighting, safety, and topography need to be considered when evaluating potential use of this improvement type.

Bridges

Bicycle and pedestrian bridges, or overcrossings, provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, waterways or, in many cases in Kaysville, major



A grade-separated undercrossing in Logan, Utah that uses the existing slope and riverbed to pass under a roadway



New bridges (overcrossings) should accommodate pedestrians and bicyclists, both on the structure and on the approaches

transportation corridors. Improving the existing bridges or constructing new crossings over I-15 was the most common requested improvement during this planning process.

FULL SIGNALS

Full signals, or signalized intersections, control competing flows of traffic from multiple legs of an intersection. They can be placed at road intersections, pedestrian crossings, and other locations. Full signals alternate right of way between conflicting directions of traffic and user types. Not all full signal recommendations may be warranted. Often, improvements for bicyclists and pedestrians cannot be measured due to lack of use without a safe or accommodating facility.

BEACONS

Hybrid Beacons

A hybrid beacon, or High-intensity Activated CrossWalk (HAWK), consists of a major-street-facing signal head with two red lenses above a single yellow lens. Hybrid beacons were developed specifically to enhance pedestrian and/or bicyclist crossings of major streets in mid-block locations and at minor intersections where side street volumes do not support installation of a conventional traffic signal. It may also be beneficial to consider turning restrictions or other geometric changes.

TOUCANS

TOUCANS are similar to hybrid beacons as they pertain to use by bicyclists and pedestrians and are primarily used at intersections. The signal head facing major street traffic looks and functions like a full traffic signal head. Separate pedestrian and bicycle signal heads facing the cross street allow different indications for different users.

Rapid Rectangular Rapid Flashing Beacons (RRFBs)

A Rectangular Rapid Flashing Beacon, or RRFB, is a user-actuated, amber flashing light system that supplements warning signs at un-signalized intersections or mid-block crosswalks. The beacons can be actuated either manually by a push-button or passively through detection.



Hybrid beacon, or HAWK



A TOUCAN beacon at the north entrance to Liberty Park in Salt Lake City. The TOUCAN was combined with a right-in, right-out treatment for motor vehicles, allowing bicyclists and pedestrians to enter and exit the park on 600 E while avoiding attraction of non-local traffic into surrounding neighborhoods.



Rapid Rectangular Flashing Beacons (RRFBs) in Ogden, Utah

RRFBs use an irregular (rapid) flashing pattern and can be installed on either two-lane or multi-lane roadways (but should generally not be used where pedestrians cross more than two lanes of traffic without a refuge; additional guidance on where they are appropriate is found in *Appendix A: Design Guidelines*).

RRFBs are the most common recommended spot improvement facility type in this plan. They are relatively low cost, can be used to alert drivers to yield to bicyclists and pedestrians when they have the right-of-way crossing a road, and have been shown to improve driver yielding compliance up to 95% in most locations.



Roundabout improvements include curb ramps, marked, high visibility crosswalks, signage, and channelizers



*Curb extensions, shown here in a residential Kaysville neighborhood, shorten crossing distances for pedestrians and can calm traffic as well without reducing roadway capacity
(Photo: Shaunna Burbidge)*

INTERSECTION IMPROVEMENTS

General Improvements

Some recommended intersection improvements are general improvements like reduce turn radii in order to lower turning vehicle speeds, improve pedestrian comfort, narrow a crossing, or improve signal timing.

Roundabout Improvements

In single lane roundabouts, it is important to indicate right-of-way, priority, and other circulation rules to motorists, bicyclists, and pedestrians using appropriately designed signage, pavement markings, and geometric design elements like channelizers, bike lane bypasses, and shared-use paths.

Crosswalks

Some of the intersection improvement recommendations were as simple as adding a crosswalk where they were missing or upgrading an existing crosswalk to have higher visibility.

TRAFFIC CALMING

Curb Extensions

Curb extensions visually and physically narrow the street creating shorter and safer crossings for pedestrians and bicyclists, increase predictability for all users, and potentially slow motor vehicles at crossings. They can be installed mid-block or at intersections.

Curb extensions can be used as standalone traffic calming or in conjunction with other treatments in this chapter. One advantage of curb extensions at signalized intersections is that they reduce the time needed for pedestrian crossings and can thereby increase intersection capacity while reducing wait times for all users. Where curb extensions are installed without a designated pedestrian crossing, like at the beginning of a school zone, they can also act as an extension of the public space on the adjacent sidewalk.

Median Refuge Islands

A median refuge island is located in the middle of the roadway, usually in the center turn lane, for bicyclists and pedestrians to use when crossing a street. Median refuge islands also provide added comfort and should be designed to direct users to see oncoming traffic

before crossing the remainder of the road. They reduce crossing distances, allow staged crossing of the roadway, and improve visibility of bicyclists and pedestrians crossing the roadway.

TRAILHEADS

In this plan, trailheads were only recommended along paved, shared-use paths. Trailheads can be sited at regular intervals along popular, regional shared-use paths in order to increase access and the attractiveness of the path. Trailheads can offer parking areas for those who want to use the path but are not able to or are uncomfortable riding or walking from their home. Other trailhead elements can include restrooms, water, signage, interpretive centers, or other amenities.

BICYCLE PARKING

Secure end-of-trip accommodations, like bike parking, encourage people to travel by bicycle. Some location-specific bicycle parking recommendations are included in the recommendations map. In addition to these, Kaysville City should consider implementing a bicycle parking program outlined later in this chapter.

On-Street Bikeway Recommendations

This section outlines how recommended, on-street bikeways will improve the connectivity to and comfort of Kaysville's existing and proposed facilities and destinations. In the online survey, the public identified their desire for their City to have more on-street facilities as a desired compliment to the existing off-street system and neighborhood streets.

Traditional on-street bikeways, like bike lanes, have typically served more experienced bicyclists. However, several of the facility types proposed in this plan, like bicycle boulevards and separated bike lanes, will cater to people of all ages and abilities who want to ride a bicycle.

RETROFITTING EXISTING STREETS FOR ON-STREET BIKEWAYS

Many streets are characterized by conditions (i.e. high vehicle speeds and/or volumes) for which dedicated on-street bikeways are the most appropriate facility to accommodate people on bicycles.



Median refuge island near Snow Horse Elementary School (Photo: Shaunna Burbidge)



Bicycle parking at the Farmington library branch

Much of the guidance provided in this section focuses on effectively reallocating existing street space through striping modifications without the need for widening. Ideally, space for bicyclists could be provided without reducing roadway or parking capacity, however it is often necessary to balance the needs of multiple user groups, especially in terms of safety.

Three main strategies have been proposed to accommodate bikeways on Kaysville streets, though many recommendations are possible without any of these strategies:

Roadway Widening

In the absence of curb and gutter, shoulder widening presents a viable option for incorporating dedicated bikeways into an existing street. Where widening is already planned, ensure that recommended bicycle and pedestrian facilities are incorporated into the design.

Lane Narrowing or Reductions

Many streets in Kaysville have 12-13' wide travel lanes, wider than specifications prescribed in national roadway design standards. Maintaining lanes as wide as these means that, in some cases, there is not space left on the roadway to implement bicycle facilities. Most national standards allow for the use of 10' or 11' lanes, and the latter width was used throughout the recommendations process.

Parking Reduction

Bike lanes can replace one or more on-street parking lanes on streets where excess parking exists (like where on-street parking is adjacent to redundant off-street lots) and/or the importance of bike lanes outweighs parking needs (like where homes back up to a road and where there are no fronting uses).

In some cases, parking may be needed on only one side to meet demand. Eliminating or reducing on-street parking also improves sight distance for bicyclists in bike lanes and for motorists on side streets and driveways.

SEPARATED, OR PROTECTED, BIKE LANES -----

Separated bike lanes are protected from traffic by a physical barrier of some kind and are also distinct from the sidewalk. Some separated bike lanes are at street level, while others are raised. There are many different types of physical separation that can be used for separated bike lanes: planters, raised curbs, parking, stationary or flexible bollards, and other streetscape elements. The applicability and feasibility of different types of separation depend on traffic volumes, speeds, driveway and cross street frequency, presence and type of on-street parking, maintenance capacity, and pedestrian volumes. Separated bike lanes can be configured for either one-way or two-way travel.

BUFFERED BIKE LANES -----

Buffered bicycle lanes add a painted buffer to a conventional bike lane (described below) but do not have the physical buffer or separation of a separated bike lane. The painted buffer can provide additional



A separated bike lane in suburban Boulder, Colorado using posts & concrete curb stops as a physical barrier



Buffered bike lanes have a painted buffer on the travel lane and/or parking lane side, based on volumes, speeds, and parking turnover

space between the bike lane and the adjacent travel lane and/or parking lane, providing a more comfortable experience for bicyclists. In some cases, buffered bike lanes are an effective tool to discourage motorists from driving or parking in a bike lane that would otherwise be excessively wide, like where the bike lane has replaced a parking lane or a wide shoulder.

BIKE LANES -----

A bike lane provides a striped lane with bicycle pavement markings and optional signage for one-way travel by bicyclists on the street. Many of the bike lane recommendations in this plan will occur in conjunction



Bike lanes are delineated from the adjacent travel lane by a painted line parallel to the lane

with pavement resurfacing or roadway reconstruction, while others can be implemented immediately.

BICYCLE BOULEVARDS

Bicycle boulevards are naturally or artificially-created low-volume, low-speed streets that enhance comfort for bicyclists as well as residents and pedestrians by using a variety of treatments, such as signage, pavement markings, traffic calming, and/or traffic diversion and intersection modifications.

Bicycle boulevards ensure that traffic volumes and speeds remain at levels that do not compromise bicycle or pedestrian comfort. Many of the improvements intended for bicyclists are also advantageous for pedestrians, schools, and homeowners. Bicycle



Bicycle boulevard treatments include traffic diversion, calming and speed reduction, and wayfinding signage, among others

boulevards create calmer traffic conditions and have been shown to have a positive impact on property values.² Bicycle boulevards also often create natural walking corridors and more pleasant streets.

Specific calming techniques and intersections are not included in the recommendations maps or spot improvements data as they will depend on circumstances and existing conditions at each intersection. Some intersections may not need any modifications to be comfortable for use by people on bikes. Typically, local streets with vehicle speeds at or below 25 miles per hour and vehicle volumes at or below 3,000 vehicles per day (with 1,500 vehicles per day preferred) are the most appropriate for bicycle boulevards.

SHARED LANE

Though not technically a facility type, shared lanes, or shared roadways, are often recommended on low speed corridors where bicycle facilities requiring a dedicated lane may not be feasible or warranted and where bicyclist speeds will likely mean that they will be using the travel lane. Installing shared lane markings, or sharrows, will better link other facility recommendations and create a more cohesive network.

Cost Estimates

Active transportation facilities can vary considerably in cost and as such the costs shown in Table 4.1 provide a "middle of the road" estimate. For example, providing a bike lane on a street could be as simple as adding a single white line and periodic stenciling if the outside travel lane is wide enough. Streets that need complete restriping to accommodate a bike lane would be considerably more, while streets that are already being resurfaced would reduce the marginal cost of the bike lane to a negligible percentage of the project. Similarly, spot improvements can vary in complexity and quality depending on the individual site conditions. More detailed, project-specific cost estimates included in *Appendix B: Project Information*.

² Rice, E., 2008 - Valuing Bike Boulevards in Portland Through Hedonic Regression, USP 570 Analytical Term Paper

Appendix A

Table 4.1 Estimated Facility Type Cost Estimates Each or Per Mile (Center Line), and Installations/Miles Per \$100,000 (Center Line)

	Cost Each or Per Mile (Center Line)	Units/Miles per \$100,000
Shared-Use Path	\$250,000-\$1,000,000	0.1-0.4 miles
Unpaved Trails	\$65,000	1.5 miles
Sidewalks	\$400,000	.25 miles
Grade-Separated Crossings	\$200,000-\$7,000,000	Varies
Full Signals	\$165,000	0.6 signals
Hybrid Beacons	\$77,000	1.3 beacons
Toucans	\$165,000	0.6 Toucans
RRFBs	\$22,000	4.5 beacons
Intersection Improvements	Varies	Varies
Traffic Calming	Varies	Varies
Trailheads	\$75,000	1.3 trailheads
Bicycle Parking	\$200-\$5,000	20-500 parking areas
Separated Bike Lanes	\$500,000	0.2 miles
Buffered Bike Lanes	\$10,000-\$18,000	5-10 miles
Bike Lanes	\$4,000-\$7,000	15-25 miles
Bicycle Boulevards	\$14,000	7 miles
Shared Lanes	\$7,000	14 miles

Policy, Land Use, or System-Wide Recommendations

One of the goals of Wasatch Front Regional Council's Transportation and Land Use Connections (TLC) grant program, which helped to fund this and Farmington's active transportation plans, is to encourage and provide resources to local communities to "integrate their land use and regional transportation plans by proactively addressing anticipated growth" in order to "create liveable and vibrant communities."

Many of the non-infrastructure, policy, and land use recommendations in this section support that goal. The City should seek additional ways to not only retrofit their existing street and path networks to work better for bicyclists and pedestrians, but also to modify existing and introduce new land use policies into city codes, development standards, plat approval processes, and impact fees. Doing so will foster development that inherently prioritizes walking and bicycling as normal, viable, safe, and comfortable forms of transportation and recreation.

Where there are conflicts between infrastructure or policy recommendations and existing policies or zoning codes (see “Existing Codes & Policies” on p. 15), the Kaysville City Council and Planning Commission should weight the importance of connecting homes and destinations with maintaining the character of some neighborhoods (i.e. Old Town Kaysville). In most cases, both objectives can be met simultaneously. Any changes to the existing codes and policies should be considered with input from all parties affected by such a change.

POLICY AND LAND USE RECOMMENDATIONS

Wasatch Choice 2040 Tools

The Wasatch Front Regional Council offers many tools to their constituent communities to make development and refinement of some of this plan’s recommended land use and other policies easier. The following descriptions are from WFRC’s online Wasatch Choice 2040 (WC2040) toolbox.



Envisioning Centers. A method to utilize the WC2040 toolbox in a dialogue with residents



Envision Tomorrow Plus. A scenario planning software, allowing communities to better visualize results of different policies



Form-Based Code. Provides a model code document and a manual for cities wishing to modify their local codes



Housing & Opportunity Assessment. Helps cities understand impediments and opportunities for housing equity



Implementing Centers. Methods and strategies to finance transit-oriented development infrastructure



Complete Streets. An approach to ensure that all users are considered with each street investment



A “complete street” in Portland, Oregon, where bike lanes, travel lanes, parking, and light rail are all functioning in the same roadway right-of-way

Complete Streets Policy or Ordinance

Kaysville should consider adopting a Complete Streets approach, policy, or ordinance. Complete Streets does not mean that every street in Kaysville has to perfectly accommodate all transportation modes, ages, and abilities. Instead, an approach, policy, or ordinance will ensure, with differing degrees of rigidity, that, at the least, all users are considered with each opportunity for change and investment.

Many jurisdictions around the country have adopted Complete Streets policies and they can be used as model starting point. A Complete Streets policy is one way to institutionalize the goals of this plan within the City.

The City should, in conjunction with this recommended policy/ordinance or not, revise the Impact Fee Facilities Plan’s Streets section’s standard roadway cross sections to include adequate sidewalks and on-street bicycle facilities.

Examples and Resources: [Smart Growth America Resources Page](#); [Salt Lake City’s Ordinance](#); [Salt Lake County Ordinance](#); [WFRC Vision, Mission, and Principles](#)

Promote Increased Connectivity on New & Existing Streets

Smaller block lengths and more frequent intersections promote walkable and bikeable neighborhoods. A street connectivity index that calculates the number

of street links between intersections divided by the number of street nodes can help ensure that street networks are appropriately connected. A traditional grid like downtown Kaysville's typically has an index of 2.0 or higher.

Kaysville City should consider establishing a street connectivity retrofit plan to address the existing street system. In addition to a quantitative approach (link-node), this plan recommends qualitative considerations of how comfortable, inviting, and well-maintained existing and planned connections are. WFRC is currently developing a regional study that would quantify local benefits of improved street connectivity. Resources and tools from that study could be helpful to the City if they pursue such a plan or policy.

Examples and Resources: [Kentucky Transportation Cabinet, Street Connectivity Zoning and Subdivision Model Ordinance](#)

Adopt a Form-Based Code

Form-based codes can provide development and permitting incentives that would support development patterns that contribute to an environment that is friendlier to people walking and bicycling. Focusing on the physical forms of buildings and development, form-based codes encourage more compact development while maintaining the city's identity, history, and community values. This approach often results in more and improved opportunities for investment, economic development, and walking and bicycling.

Examples and Resources: [Wasatch Choice for 2040 Form-Based Code Tool](#)

Pedestrian Overlay Districts

This type of overlay district helps create what the American Planning Association calls "a safe, attractive pedestrian-friendly environment where the risk of pedestrian injuries or fatalities is minimized through the application of appropriate development standards."

Pedestrian overlay districts are superimposed on one or more zones on a zoning map. Allowed uses, development, architectural elements, and circulation design encourage development that naturally foments



Some elements of pedestrian overlay districts are found on Kaysville's Main Street downtown, like zero-setback buildings, shade trees, and ground floor commercial uses (Photo: Shaunna Burbidge)

pedestrian activity and encourages active commercial and service uses on the ground floor of buildings.

Essentially, by designing for pedestrians near existing or future homes, businesses, parks, and schools, the City can provide services more efficiently, spur economic opportunities, create place identity, reduce conflicts between transportation modes, mitigate congestion, and reduce travel and parking demand while also reducing infrastructure and utility costs.

Potential locations for pedestrian overlay zones could be near planned transit-oriented development, in downtown, or where economic development is desired.

Examples and Resources: [American Planning Association's Model Ordinances to Help Create Physically Active Communities; Raleigh, NC Pedestrian Business Overlay District Code Language](#)

School Zone and Neighborhood Design Policies

The City should develop or adopt design and development standards that prioritize connectivity between homes and schools. Overtime, implementation of such standards will decrease distances between homes and schools, reduce the need for and cost of bussing students to and from schools, improve safety along and across roadways near schools, and reduce parking and drop off demand for vehicles accessing school zones.



Several new schools in Kaysville have implemented important safety improvements at or near their properties (Photo: Shaunna Burbidge)

In addition to development standards that improve connectivity to schools, the City should choose several treatments from *Appendix A: Design Guidelines* to implement at and near new or renovated schools within city limits. Coordination with Davis School District and UDOT is encouraged in order to fund, implement, and maintain these improvements.

Examples and Resources: [Safe Routes to School Guide's Engineering Webpage](#)

Road Surface and Paving Standards

Kaysville City should continue to investigate using a smaller standard paving aggregate chip size, such as 1/4 inch or 3/8 inch, on roads that are or may be used by bicyclists, and especially on the most popular on-street biking routes.

Smaller chip sizes and shapes that lay flat without the need for years of compaction, in addition to the use of a seal coat (an additional coat of oil applied after the chip) will greatly improve pavement smoothness and bicyclist comfort. The City should also consider the following pavement management strategies:

- Maintain a smooth, pothole-free surface
- Ensure that the finished surface on bikeways does not vary more than 1/4 inch on new roadway construction



The chip size on an Angel Street project in Kaysville (pictured before resurfacing was complete) raised some concerns from residents and bicyclists (Photo: Shaunna Burbidge)

- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred

Examples and Resources: [Washington State DOT Pavement Surface Condition Field Rating Manual for Asphalt Pavements](#)

PROGRAM RECOMMENDATIONS

These non-infrastructure program recommendations can encourage people to walk and ride more often by complementing the built infrastructure network and removing some of the common stigmas or barriers to walking and bicycling.

Bicycle Parking Program / Policy & Development Regulations

Bicycle parking is an important component of the bicycle network. Kaysville City should consider implementing the Association of Bicycle and Pedestrian Professionals' (APBP) Bicycle Parking Guidelines into its respective development code as well as creating a standalone economic development and business outreach program. This two-pronged approach will address proper rack design, placement, and quantity of bicycle parking. The former will ensure that future development or redevelopment includes secure parking for people

arriving by bicycle while the latter can offer reduced cost bike racks to requesting businesses.

Examples and Resources: [Association of Pedestrian and Bicycle Professionals' \(APBP\) Bicycle Parking Guidelines](#)

Bicycle and Pedestrian Count Program

One way to determine the success of the walking and bicycling system is an on-going or annual program that counts bicyclists and pedestrians. Tracking user counts can identify which facility and program improvements are increasing bicycling and walking rates, reducing crashes involving bicyclists and pedestrians, and improving overall perceived safety and comfort. Automated, off-street shared-use path counters should be installed along key segments of popular corridors to provide reliable, simple, day-to-day collection of user counts. Traffic signals with the capability to count bicyclists and pedestrians should also be specified as signals are installed or upgraded.

The data gleaned from this program will also simplify creation of the Annual Report recommended in the implementation chapter of this plan.

Examples and Resources: [National Bicycle and Pedestrian Documentation Project](#); [Utah Bicycle and Pedestrian Counts Guidebook](#)

Unified Wayfinding Program

Development of a complete wayfinding system for Kaysville's walking and bicycling network can help publicize and facilitate use of active transportation facilities in the city.

Wayfinding signage provides destination, direction, and distance information to bicyclists and pedestrians navigating through the City. Wayfinding signs that highlight bikeways, ideal walking routes, bike parking locations, and nearby points of interest can also be coupled with kiosks at major destinations. If desired, Kaysville City should coordinate with surrounding cities and Davis County to ensure consistency with any future local and regional wayfinding standards.

Examples and Resources: [Jackson, WY Bicycle Improvement Plan's Bikeway Wayfinding Chapter](#)



Bicycle wayfinding signage in Jackson, Wyoming

Logan, UT Bicycle and Pedestrian Wayfinding System; Fort Collins, CO Bicycle Wayfinding Network Master Plan

Sidewalk and Crossing Infill & Construction Program

Construction, management, and maintenance programs help renew and expand sidewalk networks. This program has the following program and policy components:

New Construction or Rehabilitation in the City or County's Right of Way – The City should coordinate improvements and bid out sidewalk, crossing, and signal construction and other rehabilitation projects once a year at as high of a volume as can be accommodated for the best prices and efficiency. Sidewalks near schools should be prioritized first, followed by gaps that would greatly enhance the overall connectivity of the network.

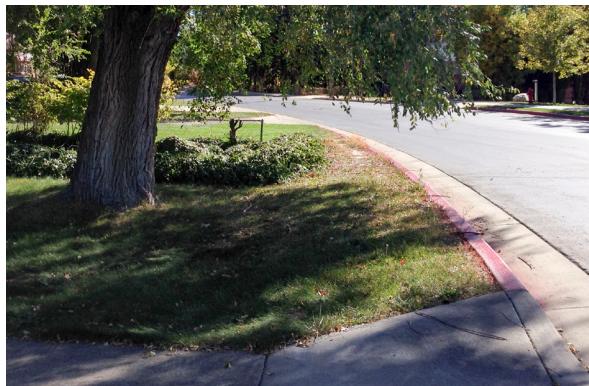
Sidewalk replacement and expansion – The City should continue or begin to implement the following sidewalk strategies, programs, or policies to encourage sidewalk

rehabilitation and construction where property owners are involved.

- Offer no-interest (for partly-financed repairs) and low-interest (for entirely-financed repairs) loans to property owners who wish to replace or rehabilitate sidewalk that fronts their property. The City should ensure that funding for the no- or low-interest rate loans is available each year
- Dedicate funding to an expanded sidewalk replacement or expansion program through a 50/50 cost sharing sidewalk replacement program where sidewalk construction costs are divided evenly between the City and the property owner, or, implement a "Health Plan" style sidewalk replacement policy in which the financing model is based on the concept used in the health insurance industry. This policy allows property owners to pay in a fair amount regardless of property size or frontage length.

Crosswalk Policy – The City should adopt a crosswalk policy that establishes appropriate crosswalk types for specific roadway crossing types. High-visibility, piano key-style marked crosswalks should be installed at school crossings, busy intersections, and midblock crossings; parallel bar markings may be installed at other acceptable locations. This is especially important where sidewalks are present. ADA-compliant curb ramps should also always be provided when crosswalks are installed.

Examples and Resources: [Helena, MT Neighborhood Transportation and Volunteer Sidewalk Program](#)



A gap in the sidewalk near Farmington library branch



A small tractor with a narrow plow attached clears a separated bike lane during a winter snow storm in Salt Lake City (Photo: SLC Public Works)

Maintenance Program

As the existing system is refined and proposed recommendations are implemented, the City should establish a multi-departmental maintenance program that involves, at a minimum, the Public Works and Parks and Recreation Departments in order to provide sweeping, snow removal, pavement management, and weed abatement and eradication.

In order to reduce future costs, shared-use sidepaths (adjacent to or affected by roadways) should not be constructed below the level of the adjacent roadway. Building them at or above the roadway level will decrease debris runoff from the road, flood risk, and the need for additional path maintenance.

Additionally, the City or other agencies coordinating and implementing bicycling and walking facilities in Kaysville should be judicious in choosing vegetation that is compatible with the facility and the climate (i.e. eliminating puncture vines and other noxious weeds along paths), reduce the burden on the maintenance program, and reduce water demand.

Examples and Resources: [Winter Bike Lane Maintenance - A Review of National and International Best Practices](#); [Advocacy Advance - How Communities are Paying to Maintain Trails, Bike Lanes, and Sidewalks](#)

SYSTEM-WIDE RECOMMENDATIONS

Some publicly-requested improvements to the existing system could not be easily shown on a map. Instead, the following are global, systemic recommendations.

Shared-use Path Access Control

Improving the current access control along the D&RGW Rail Trail (double, off-set gates) was one of the most common public comments during the online survey, interactive mapping exercise, and open house. Most cited the difficulty with which they maneuvered bike trailers, strollers, trail-a-bikes, and their own bicycles around one or both gates. Several cited first or secondhand accounts of falls at or near the gates because of this difficulty.

Although restricting motor vehicle access to the trail is necessary, doing so by physical means is not recommended unless there is a documented problem. "No Motorized Vehicles" signs are normally sufficient.

There are several methods that the City could test at several different locations in order to control trail and roadway user speeds and increase awareness of trail users at intersections. Before and during the test, the City should poll users to identify the most desired method of access control. Additional measures and more detail in the *AASHTO Guide for the Development of Bicycle Facilities*, Chapter 5, and *Appendix A: Design Guidelines*, should inform and direct these solutions:

- **Lateral shift of or curve in trail alignment.** Introducing an artificial lateral shift or curve in the very linear alignment of the Rail Trail will slow users to the desired speed, depending on curve radii. It can also bring the crossing closer to perpendicular to the roadway. Crossings should be, at a minimum, 60, and ideally, 90 degrees.
- **Perpendicular pavement markings.** Install thermoplastic or other raised pavement markings perpendicular to the trail with increasingly less space between each one as the trail approaches a crossing.
- **Perpendicular pavement cuts.** A similar technique to pavement markings, but using negative space to provide a tactile warning for trail users approaching a crossing. Ensure that the cuts do not negatively affect the pavement quality or longevity.
- **Large informational pavement markings.** Place larger "Trail X-ing" markings on trails and trail approaches that capture trail users' and motorists' attention and slow them down.



Existing gated access control of the D&RGW Rail Trail



The above example shows a curve in the trail alignment combined with perpendicular pavement markings that visually and tactiley slow trail users before the intersection.



Split path treads with low landscaping

- **Open one of the two gates.** Slow and deflect trail users without requiring two turns around two gates on each side of each crossing.
- **Split path with landscaping.** Split the path tread into two directional sections separated by low landscaping.

Appendix A

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A young resident riding her bike next to a local residential street (Photo: Russ Lindberg)

5: Prioritization & Implementation

Introduction

Implementation strategies for active transportation projects require a blend of careful planning and opportunistic decision-making. On-street projects, like bike lanes, can often be implemented quickly and efficiently when coordinated with planned roadway projects or pavement management activities like overlays or seal coatings. Conversely, shared-use path projects may require more extensive easement negotiations, permitting, or fundraising to reach construction.

The following project prioritization methodology should serve as a general guide for prioritizing investment in the active transportation system. However, flexibility in implementation is highly encouraged when opportunities arise to share resources, achieve cost savings, or partner with other agencies (such as UDOT, Davis School District, Davis County, or UTA).

For each project identified as part of the proposed system, scoring was established based on criteria and weighting agreed upon by the project's Steering Committee, including City staff. Spot improvements associated with proposed routes should default to the recommended phasing for the route they help facilitate, even if scoring indicates another (especially an earlier) phase.

Proposed projects were classified into three categories:

- **Off-street projects** (shared-use paths, unpaved trails, and sidewalks)
- **Spot Improvements** (intersection and crossing improvements, signals and beacons, grade-separated crossings, etc.)
- **On-street projects** (bike lanes, buffered bike lanes, separated bike lanes, and bicycle boulevards)

Project Prioritization Criteria

The project prioritization framework relies upon facility category-based criteria. The following criteria will be applied to each facility (except "Resurfacing Projects", which is only applicable to on-street bicycle facilities). Each recommended facility will be assigned a numeric value to the degree it meets the criteria requirements. The criteria values are outlined in Tables 5.1 and 5.2. The criteria multipliers were determined by the Steering Committee and can be adjusted by City preference to align with Kaysville's values and priorities in the future.

Scoring criteria are generally divided into two sections:

- Positive scoring criteria, which possess the ability to raise a project's priority
- Negative scoring criteria, which possess the ability to lower a project's priority

(+) POSITIVE SCORING CRITERIA (SEE TABLES 5.1 AND 5.2)

Public Support

Public support is an important criterion when evaluating potential bicycle and pedestrian facility improvements. Throughout the Kaysville & Farmington Active Transportation Plan process, the project team received feedback from more than 1,000 people via an online public survey and heard from several hundred more at a public open house and through the project website. Input received through these means will be used to determine the scoring of this category. Additionally, latent or apparent demand for a facility will fall under this criteria.

Connectivity to Existing Facilities

Creating connectivity to existing bicycle or pedestrian facilities enable more trips to be made and provides bicyclists or pedestrians multiple routes for reaching their destinations. Facilities that connect to an existing path, bike lane, or other dedicated facility will receive points for this scoring criterion.

Connectivity to Proposed Facilities

In addition to the existing bicycle and pedestrian network, this plan recommends the addition of many projects throughout the city. While not as immediately effective for bikeway continuity, facilities that connect to proposed facilities will, in time, help create a robust and cohesive network. Proposed facilities that intersect with other proposed facilities will be awarded points for this criterion.

Network Gaps

Gaps in the bicycling and walking networks discourage bicycling and walking because they limit route continuity, require users to choose less direct paths to access their destinations, or don't allow access whatsoever by bicycle or on foot. Facilities that fill gaps

in the existing bicycling and walking network will qualify for this criterion.

Connectivity to Parks or Civic Centers

Increasing accessibility to parks and civic locations (such as City Hall or the library) was a popularly requested improvement in the public involvement process and projects that add or improve upon connectivity to these destinations qualify for this criterion.

Connectivity to Schools

More than 1/3 of Kaysville's population is under the age of 16 and cannot drive themselves to school. Even for those over 16, able to drive, and attending high school, walking and bicycling to school can improve academic performance. Across the board, reducing the number of students who are driven or bussed to school will reduce traffic volumes and congestion, and will improve air quality. In an effort to encourage more students to walk and ride a bicycle to school and to help parents and guardians feel comfortable allowing their children to do so, proposed facilities that directly connect to or are within ¼ mile of any K-12 school qualify for this prioritization criterion.

Connectivity to Churches

Increasing accessibility to the churches and other places of worship in Kaysville can help reduce traffic congestion. With improved connections and opportunities to walk and bike to church, community members have the opportunity to decrease driving trips and amount of space needed for parking lot. Projects that connect to or are within ¼ mile of churches and worship center properties qualify for this prioritization criterion.

Connectivity to Retail Centers

Retail and commercial centers, like Downtown, stores on 200 North and Main Street, and grocery stores, represent major destinations used by residents and visitors every day. Increasing bicycle and pedestrian connectivity to these destinations will allow many of these trips to be converted into walking and bicycling trips. Projects that connect directly to or are within ¼ mile of retail centers qualify for this prioritization criterion.

Connectivity to Employment Centers and Jobs

Even though less than 20% of daily trips in Davis County are between home and work, commute trips to jobs in Kaysville can be converted into bicycling and walking trips, especially when the trip begins with transit. Bicycling and walking facilities that connect to employment centers, and thereby allow employees to get to work more easily on foot or by bike, qualify for this criterion.

Connectivity to Transit

As evidenced earlier in this plan, people are much more likely to use transit if they can get there by bike or on foot. Improving connections to transit stations, like FrontRunner, and Park and Ride locations, will improve perceived safety and comfort, as well as encourage people to ride transit more. Facilities that provide this connectivity to transit qualify for this criterion.

Safety

Maintaining or improving safety is a prerequisite for all bicycle and pedestrian projects. Safety is also the primary concern for people when choosing to ride or walk instead of drive. Projects that address or remedy existing safety issues for bicyclists and/or pedestrians and/or are located at the location or within 1/8 mile of a crash that involved a bicyclist or pedestrian qualify for this criterion.

Cost Efficiency

Projects that require little capital investment but yield high benefits for all users, but especially for bicyclists and pedestrians, are attractive projects for immediate implementation following adoption of this plan. These projects will demonstrate progress and foster momentum for difficult or costly improvements in the future. Projects that greatly improve bicycling and walking conditions in respect to their capital costs qualify for this criterion.

Resurfacing Projects (only applicable to Table 5.2)

On-street bicycle facilities like bike lanes, buffered bike lanes, and separated, or protected, bike lanes can more easily be installed when a street is scheduled to be resurfaced, seal coated, or widened. Furthermore, developers should be required to include

recommended facilities in the Kaysville & Farmington Active Transportation Plan that are located on streets they are constructing, improving, or otherwise impacting significantly. Facilities that coincide with street repaving or resurfacing projects will meet this scoring criterion.

(-) NEGATIVE SCORING CRITERIA (SEE TABLES 5.1 AND 5.2)

Jurisdiction

This criterion considers which agency or agencies own the right-of-way in which projects are proposed and whether or not the project is outside of City limits or on non-City-owned land. It should be noted that all on-street recommendations in the plan in Kaysville City limits are possible within the public right of way, even if roadway widening is necessary.

Projects within the City limits and within the public right-of way receive no deduction. Projects within the City limits but owned or managed by another entity (i.e. UDOT, private property owner) would receive a deduction in points. Projects that lie outside the City limits and the public right-of-way would receive the maximum deduction in points possible for this criterion. This negative criterion and scoring is not an indictment of the project's value, but rather that the project is more difficult to implement and may be built and funded by another agency.

Even though the preliminary alignments of some off-street projects (paths or trails) are shown on the edges of private property, use of eminent domain is not allowed for paths and trails in Utah. The plan's recommended off-street facilities will not take precedence over private property rights and representation of trails to all affected property owners will be open and candid.

Development Potential

This criterion considers whether or not a proposed facility has the potential to be constructed by future private development. This criteria seeks to lower the priority of bicycle and pedestrian improvements that could be constructed by private development in the future. Projects that could likely be built by private development in the next ten years would qualify for this criterion.

Appendix A

Table 5.1 Recommended Off-Street Linear or Spot Improvement Project Prioritization Criteria

Criteria	Score	Multiplier	Total	Description
Public Support	2	4	8	Identified multiple times by the public as a future facility, or, significant demand
	1		4	Identified by the public once as a future facility, or, reasonable demand
	0		0	Not identified for a future facility during this public involvement process
Connectivity to Existing	2	3	6	Direct access to two or more existing facilities
	1		3	Direct access to one existing facility
	0		0	Does not directly or indirectly access an existing facility
Connectivity to Proposed	2	2	4	Direct access to two or more proposed facilities
	1		2	Direct access to one proposed facilities
	0		0	Does not directly access any proposed facilities
Network Gaps	2	3	6	Fills a network gap between two existing facilities
	1		3	Fills a network gap between an existing and a proposed facility
	0		0	Does not directly or indirectly fill a network gap
Parks & Civic Centers	2	1	2	Direct access to a park or civic center (library, City Hall)
	1		1	Secondary access to a park or civic center (within ¼ mile)
	0		0	Does not provide connectivity to any parks or civic centers
Schools	2	5	10	Direct access to a school
	1		5	Secondary access to a school (within ¼ mile)
	0		0	Does not directly or indirectly access a school
Churches	2	1	2	Direct access to a church
	1		1	Secondary access to a church (within ¼ mile)
	0		0	Does not provide direct or indirect access to a church
Retail Centers	2	2	4	Direct access to a retail center
	1		2	Secondary access to a retail center (within ¼ mile)
	0		0	Does not provide any connectivity to a retail center
Employment Centers	2	3	6	Direct access to an employment center
	1		3	Secondary access to an employment center (within ¼ mile)
	0		0	Does not provide any connectivity to an employment center
Transit	2	3	6	Direct access to a FrontRunner station or Park and Ride
	1		3	Secondary access to a FrontRunner station or Park and Ride (within ¼ mile)
	0		0	Does not provide any connectivity to a FrontRunner station or Park and Ride
Safety	2	5	10	Addresses a significant safety problem or at the location of a crash
	1		5	Addresses a minor safety problem or within 1/8 mi of a crash
	0		0	Does not directly contribute to improving a safety problem
Cost Efficiency	2	4	8	Provides exceptional cost-benefit value
	1		4	Provides above average cost-benefit value
	0		0	Provides average cost-benefit value
Jurisdiction	2	-1	-2	Located outside of City limits and not in the public right-of-way
	1		-1	Located in the City but on land owned or managed by another entity
	0		0	Located in the City and within the public right-of-way
Development Potential	2	-3	-6	Likely funded, constructed through development in short term
	1		-3	Likely funded, constructed through development in medium term
	0		0	Development not likely, or through development but in long term

Appendix A

Table 5.2 Recommended On-Street Project Prioritization Criteria

Criteria	Score	Multiplier	Total	Description
Public Support	2	4	8	Identified multiple times by the public as a future facility, or, significant demand
	1		4	Identified by the public once as a future facility, or, reasonable demand
	0		0	Not identified for a future facility during this public involvement process
Connectivity to Existing	2	3	6	Direct access to two or more existing facilities
	1		3	Direct access to one existing facility
	0		0	Does not directly or indirectly access an existing facility
Connectivity to Proposed	2	2	4	Direct access to two or more proposed facilities
	1		2	Direct access to one proposed facilities
	0		0	Does not directly access any proposed facilities
Network Gaps	2	3	6	Fills a network gap between two existing facilities
	1		3	Fills a network gap between an existing and a proposed facility
	0		0	Does not directly or indirectly fill a network gap
Parks & Civic Centers	2	1	2	Direct access to a park or civic center (library, City Hall)
	1		1	Secondary access to a park or civic center (within ¼ mile)
	0		0	Does not provide connectivity to any parks or civic centers
Schools	2	5	10	Direct access to a school
	1		5	Secondary access to a school (within ¼ mile)
	0		0	Does not directly or indirectly access a school
Churches	2	1	2	Direct access to a church
	1		1	Secondary access to a church (within ¼ mile)
	0		0	Does not provide direct or indirect access to a church
Retail Centers	2	2	4	Direct access to a retail center
	1		2	Secondary access to a retail center (within ¼ mile)
	0		0	Does not provide any connectivity to a retail center
Employment Centers	2	3	6	Direct access to an employment center
	1		3	Secondary access to an employment center (within ¼ mile)
	0		0	Does not provide any connectivity to an employment center
Transit	2	3	6	Direct access to a FrontRunner station or Park and Ride
	1		3	Secondary access to a FrontRunner station or Park and Ride (within ¼ mile)
	0		0	Does not provide any connectivity to a FrontRunner station or Park and Ride
Safety	2	5	10	Addresses a significant safety problem or at the location of a crash
	1		5	Addresses a minor safety problem or within 1/8 mi of a crash
	0		0	Does not directly contribute to improving a safety problem
Cost Efficiency	2	4	8	Provides exceptional cost-benefit value
	1		4	Provides above average cost-benefit value
	0		0	Provides average or below average cost-benefit value
Resurfacing Projects	2	2	4	Street likely repaved or improved within 5 years, or, bicycle boulevard
	1		2	Street likely repaved or improved in 6-10 years
	0		0	Street unlikely or not scheduled to be improved for >10 years
Jurisdiction	2	-1	-2	Located outside of City limits and not in the public right-of-way
	1		-1	Located in the City but on land owned or managed by another entity
	0		0	Located in the City and within the public right-of-way
Development Potential	2	-3	-6	Likely funded and constructed through development within 5 years
	1		-3	Likely funded and constructed through development in 6-10 years
	0		0	Development not likely, or through development but in >10 years

Implementation Strategies

Implementation of the Kaysville Active Transportation Plan will take place incrementally over many years. Due to the development potential of existing open space, the City should allow the processes of prioritization and phasing of bicycle and pedestrian improvements to be fluid and adjust to actual growth and future development. Flexibility and opportunistic implementation of projects are key to improving the bicycling and walking system. The following strategies can guide the City toward developing the project and policy recommendations in this plan.

IMPLEMENTATION STRATEGY 1. ESTABLISH ACCOUNTABILITY FOR ACTIVE TRANSPORTATION

It is important to establish accountability for the implementation of the active transportation system to ensure that this plan's recommendations are implemented. In the near-term absence of a staff member dedicated to bicycle and pedestrian planning and implementation, Kaysville City should seek to implement the following organizational processes to help ensure that active transportation issues are being monitored and advanced.

Near Term	<ul style="list-style-type: none">Establish an Active Transportation Task Force made up of City staff to include, at a minimum, the City Engineer, Parks and Recreation Director, Public Works Director, and Code Enforcement Officer. The Task Force should meet quarterly to discuss issues, needs, funding opportunities, and to ensure that possible recommendations are being executed.
Near/Mid Term	<ul style="list-style-type: none">Consider establishing a citizen-led Bicycle and Pedestrian Advisory Committee. Integrate the Bicycle and Pedestrian Advisory Committee into applicable City projects and review processes.
Mid Term	<ul style="list-style-type: none">Hire a part or full-time bicycle and pedestrian coordinator to monitor the system, pursue funding, manage project implementation, and lead programs within the community.

IMPLEMENTATION STRATEGY 2. ESTABLISH THE PLAN AND DESIGN GUIDELINES

The Active Transportation Plan includes many recommended improvements and implementation strategies for the future. Work with appropriate entities within and outside of the City government structure to ensure that projects are implemented in an orderly, opportunistic way.

Near Term	<ul style="list-style-type: none">Adopt the Kaysville Active Transportation Plan.Complete the prioritization exercise using criteria established in this chapter and update regularly.Further define the phases (i.e. 1-5, 6-10, 10+ years) in which projects will be placed after prioritization.Consult the <i>Bicycle & Pedestrian Facility Design Guidelines</i> when new roadways are planned so that they can be as uniform, safe, and connective as possible.Incorporate the Active Transportation Plan into development processes to ensure future development adheres to the plan's recommendations.
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IMPLEMENTATION STRATEGY 3. STRATEGICALLY & OPPORTUNISTICALLY PURSUE PROJECTS

Near Term	<ul style="list-style-type: none">Pursue capital improvement or grant funding for high priority projects first.In the case where grant requirements or construction in conjunction with another project make a lower priority project possible, pursue funding sources for that project regardless of priority or ranking.
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IMPLEMENTATION STRATEGY 4. INCREMENTALLY IMPLEMENT PROJECTS

Projects can be developed incrementally with available resources or in conjunction with other projects until funding is secured to complete the project in full.

Near / Mid / Long Term	<ul style="list-style-type: none">• Piggyback on pavement management projects in order to more easily implement on-street facilities that require a clean slate, road diet, or other roadway design changes.
Near / Mid / Long Term	<ul style="list-style-type: none">• Consider developing long and/or expensive projects in any prioritization phase incrementally based on available resources and/or funding.

IMPLEMENTATION STRATEGY 5. REGULARLY REVISIT PROJECT PRIORITIZATION

The project prioritization criteria in this Plan and subsequent ranking and phasing by City staff have been developed based on input from the project Steering Committee. The City should revisit the Active Transportation Plan every two years to evaluate progress on project development and rescore and reprioritize lower priority projects as higher priority projects are implemented and completed. Lower priority projects should be reviewed as necessary, adding new projects, removing completed projects, and revising prioritization criteria and scoring as conditions change.

Mid Term	<ul style="list-style-type: none">• Regular review and update of the prioritized project list by City staff, with input from the Active Transportation Task Force and, when initiated, the Bicycle and Pedestrian Advisory Committee (defined in Strategy 1).
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IMPLEMENTATION STRATEGY 6. PERFORMANCE MEASURES

Ongoing evaluation at a project, neighborhood, and city level can provide the City and stakeholders important information used to approximate use, demand, and effectiveness of facilities, policies, and programs. Evaluation takes many forms, including counts, surveys, user behavior analysis, retail sales analysis, vacancy rates, and safety audits.

As the City implements the recommendations of this plan, some key indicators should be used to measure success and track progress. A formal annual analysis and associated reporting can also be beneficial to show change, improvement, and success over time.

Near / Mid / Long Term	<ul style="list-style-type: none">• Implement a volunteer-driven manual count and survey of pedestrians and bicyclists that follow the standards established by the National Bicycle and Pedestrian Documentation Project (NBPDP). According to NBPDP, “without accurate and consistent demand and usage figures, it is difficult to measure the positive benefits of investments in [active transportation], especially when compared to other transportation options such as the private automobile.”• Supplement and improve manual counts through automated data collection methods that would allow for more accurate usage and trend analysis.• Create an annual report that summarizes and charts trends in participation, reported crashes, implementation of facilities, grant successes, events, and infractions related to walking and bicycling.
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Appendix A

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Parts of the D&RGW Rail Trail were constructed with federal monies and others with local capital funds.

6: Funding

Implementation of the proposed bicycle and pedestrian system will often require funding from local, regional, state, and federal sources and coordination with multiple agencies. To facilitate funding efforts, this section presents a brief overview of different funding sources and strategies.

Funding Sources

Many funding sources are potentially available at the federal, state, regional, county, and local levels for Kaysville City to implement the projects in the Active Transportation Plan. The majority of non-local public funds for bicycle and pedestrian projects are derived through a core group of federal and state programs. Federal funds from the Surface Transportation Block Grant Program (STBGP) are allocated to UDOT and Wasatch Front Regional Council (WFRC) and distributed by those agencies proportional to population, allowing funding to get to as many different types of communities as possible. Other programs such as the TIGER (Transportation Investments Generating Economic Recovery) grants can be used for "shovel ready" projects that meet federal transportation goals and benefit the country as a whole. County and/or City funds may also be used to construct bicycle and pedestrian facilities.

Tables 6.1 through 6.7 provide a list of funding sources that may be applicable to projects identified in this Plan. Most of these sources are competitive and require the preparation of applications. For multi-agency projects, applications may be more successful if prepared jointly with other local and regional agencies.

The City should also take advantage of private contributions, if appropriate, in developing the proposed system. This could include a variety of resources, such as volunteer or in-kind labor during construction, right-of-way donations, outreach, planning and design, or monetary donations towards specific improvements.

Additionally, the City should develop a dedicated local funding source for active transportation improvements through a general fund allocation, which will be sustainable funding that can be used to leverage other sources as well as develop projects. In addition to these funds, active transportation projects can be funded through a variety of measures at a local level: bonds financing, special improvement districts, or specified local sales taxes. The recently passed Davis County Proposition One, a \$0.025 sales tax increase, will fund more than \$11 million in local roadway, transit, and active transportation projects in Davis County in fiscal year 2017 alone. State transportation revenue will increase by \$76 million that same fiscal year.

Appendix A

Table 6.1 Local Bicycle and Pedestrian Funding Options

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Bond Financing	Varies	Varies	Varies	Though not a funding source, bonds are a financing technique. Money is borrowed against some source of revenue or collateral (i.e. parcel tax revenue). They do not increase total funding, but rather shift investment from future to present. A local successful precedent is the voter-approved Salt Lake County 2012 Parks and Trails Bond, which authorized \$47M to complete the Jordan River Parkway, Parley's Trail, acquire land, and build new parks.
Special Assessment or Taxing Districts	Varies	Varies	Local Gov't	Local municipalities can establish special assessment districts for infrastructure improvements. Urbandale, Iowa established a special assessment program in 1996 for building sidewalks in existing developments where they were missing. Exception clauses allowed residents to apply for hardship status, or to allow residents to petition for sidewalks on only one side of the street rather than both.
Development Impact Fees	Varies	Varies	Local Gov't	Development impact fees are one-time charges collected from developers for financing new infrastructure construction and operations and can help fund bicycle and pedestrian improvements, if approved. Impact fees are assessed through an impact fee program.
New Construction	Varies	Varies	Local Gov't	Future road widening and construction projects are methods of providing bicycle and pedestrian projects. To ensure that roadway construction projects provide infrastructure where needed, it is important that the review process includes a designated bicycle and pedestrian coordinator or similarly assigned liaison at the City. Planned roadway improvements in Kaysville should include bikeways and walkways.

Table 6.2 Regional, State, and Federal Bicycle and Pedestrian Funding Options (Part 1/5)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Highway Safety Improvement Program (HSIP)	Infrastructure and program safety improvements	Public road with a correctable crash history, expected to reduce crashes, positive cost-benefit ratio, or, a systemic safety project	UDOT Traffic & Safety	Program purpose is to reduce fatalities and serious injuries on public roads through infrastructure and programs. Like SSIP, HSIP can fund low cost, systemic improvements if benefit-cost is met. (http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T;V:2933)
Spot Safety Improvement Program (SSIP)	Infrastructure and program safety improvements	Location is crash-frequent, similar quals to the HSIP	UDOT Traffic & Safety	Because SSIP is only state, and not federal, money, spending can be more flexible to fix crash-prone locations before trends develop. (http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T;V:575)
Transportation Infrastructure Finance and Innovation Act (TIFIA) Loans	Large projects	Varies	USDOT	Like bonds, these loans are not funding but do provide financing options, including credit assistance in the form of direct loans, loan guarantees, and standby lines of credit for large, surface transportation projects of national and regional significance, as well as public-private partnerships.

Appendix A

Table 6.3 Regional, State, and Federal Bicycle and Pedestrian Funding Options (Part 2/5)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Bond Financing	Varies	Varies	Varies	See description in Table 6.1.
Sales Tax	Local roadways, transit, bicycle and pedestrian projects	Varies	Davis County, varies	Davis County passed a transportation-focused sales tax through HB 362 and Proposition One in 2015. Voters approved a \$0.025 increase to fund local roads, transit, and bicycle and pedestrian projects. It is estimated that revenue from the tax will top \$2.2 million for Davis County (government), \$300,000 for Kaysville, \$280,000 for Farmington, and \$50,000 for Fruit Heights in 2017. Precedents include the San Diego region, which approves a half-cent sales tax in 2008 to generate funds for highway, transit, and local road (including bicycle and pedestrian) projects; and the Great Rivers Greenway in the St. Louis area, where voters passed a proposition in 2000 to create a 0.1% sales tax for parks, open space, paths, and trails.
Transportation and Land Use Connection Program (TLC)	Varies	Exhibits a strong land use and transportation link	WFRC	Formerly known as the Local Planning Resource Program, WFRC's TLC program provides a minimum of \$40,000 in funding per project to cities who can provide at least a ~10% match (at least \$4,000) in order to integrate land use and regional transportation plans. Eligible projects may include land use scenario visioning, small area plans, corridor plans, public participation, implementation of previously-adopted plans, projects requiring multi-jurisdictional coordination and support, and site assessments.
ADA Ramps	ADA-related improvements	For missing ADA ramps on State routes only	UDOT	Applications are submitted to the Region Coordinator. Missing ramps can be found in the UDOT database from a recent survey of ramps. (http://udot.utah.gov/main/uconowner.g?n=13652716548952568)
Safe Sidewalks Program	Sidewalks	Sidewalks on State routes only	UDOT	Applications are submitted to the Region Safe Sidewalk Program coordinator and require scope and cost estimate. Local jurisdiction must agree to maintenance and the sidewalk must be built within one year of money allocation. (http://www.udot.utah.gov/main/uconowner.g?n=104675223364328443)
Passenger Enhancements	Sidewalk projects and bicycle infrastructure	Sidewalk must be within half mile and bike infrastructure must be within three miles of a transit stop	UTA	Funding can be completed in two ways. The lead agency will share in the cost of the construction, if the submitting agency has already done design and is planning to construct. If the project is on UTA's priority sidewalk list, UTA will design and construct.

Appendix A

Table 6.4 Regional, State, and Federal Bicycle and Pedestrian Funding Options (Part 3/5)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
State-Administered Community Development Block Grants (CDBG)	Street improvements	Best if project benefits low or moderate-income populations and part of a consolidated plan	HUD, State, and Local Gov't	The Grantee cannot be a principal city of a metropolitan statistical area, a city with more than 50,000 population, or a county with a population with more than 200,000. Applications are submitted to the State. (https://www.hudexchange.info/cdbg-state/)
Community Development Block Grants (CDBG) - Entitlement Communities Program	Street improvements	Best if project benefits low or moderate-income populations	HUD and Local Gov't	Grantee is a principal city of a metropolitan statistical area, a city with a population over 50,000, or a county with a population over 200,000, like Davis County. Part of a Consolidated Plan. (http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement). Only cities under 50,000 that are also in counties above 200,000 qualify for the similar WFRC-administrated CDBG "Small Cities" program.
Surface Transportation Block Grant Program (STBGP)	Bicycle and pedestrian improvements, among others	Varies	WFRC and UDOT	In the new 2016 federal transportation act (FAST), the former STP is now known as the Surface Transportation Block Grant Program (STBGP) and includes the TAP (below). WFRC accepts concept reports for consideration of programming funds. This program has a state and an MPO component. An increase in the funding share for MPOs means that larger MPOs, like WFRC, will receive more funding.
Congestion Mitigation and Air Quality (CMAQ)	Bicycle and pedestrian improvements, among others	Reduce congestion, improve air quality in non-attainment/maintenance areas by shifting travel demand away from cars	WFRC	Projects must be included in the Transportation Improvement Program selection, administered by WFRC. Calls for projects from local communities are made yearly by WFRC.
Transportation Alternatives Program (TAP)	Bicycle and pedestrian improvements only	Funds can be used for construction, planning and design of on and off-road bicycle and pedestrian facilities	WFRC and UDOT	In the new 2016 federal transportation act (FAST), the former TAP will be part of the STBGP. Though program requirements will stay roughly the same, total funding has been increased slightly. If program remains the same, most projects will have an 80/20 federal/local match split and can include sidewalks, paths, trails, bicycle facilities, signals, traffic calming, lighting and safety infrastructure, and ADA improvements. Rails-to-trails conversions are also allowed. The Recreational Trails and the Safe Routes to School programs are included.

Appendix A

Table 6.5 Regional, State, and Federal Bicycle and Pedestrian Funding Options (Part 4/5)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Land and Water Conservation Fund (LWCF)	Bicycle and pedestrian paths and trails, or acquisition of land for paths and trails	Projects that create outdoor recreation facilities, or land acquisition for public outdoor recreation	DNR	Provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources. 50/50 match is required, and the grant recipient must be able to fund the project completely while seeking reimbursements for eligible expenses. (http://stateparks.utah.gov/resources/grants/land-and-water-conservation-fund)
Rivers, Trails, and Conservation Assistance Program	Planning assistance for bicycle and pedestrian projects	Staff support for facilitation and planning	National Park Service	Projects need to be related to conservation and recreation, with broad community support, and supporting the National Park Service's mission. Applicants must submit National Park Service applications by August 1 annually, including basic information as well as letters of support. The local contact is Marcy DeMillion, at 801-741-1012 or marcy_demillion@nps.gov .
Transportation Investments Generating Economic Recovery (TIGER)	Shovel ready, surface transportation projects	Positive estimated cost-benefit ratio meeting federal transportation goals, benefitting country as a whole	USDOT, State and Local Gov'ts	Approvals for the eighth round of TIGER, totalling \$500 million, were signed into law in 2015. Pre-application and final application required. Projects involving highways, bridges, bicycle and pedestrian facilities, public transportation, rail, and intermodal are eligible.
State Legislation	Legislation dependent	Legislation dependent	State of Utah	State legislation can create laws that have dedicated bicycle funding components. Two examples of this are the Oregon "bike bill" which requires including bicycle and pedestrian facilities when any road, street or highway is built or rebuilt and the California Active Transportation Program grants, which provide state funds to cities and counties wishing to improve safety and convenience for bicyclists and pedestrians. (http://oregon.gov/ODOT/HWY/BIKEPED/Pages/bike_bill.aspx and http://www.dot.ca.gov/hq/LocalPrograms/atp/)
Federal Lands Access Program (FLAP)	Planning, engineering, construction, and other activities	Projects must be on, adjacent to, or provide access to federal lands	UDOT	Fund is administered through UDOT in coordination with the Central Federal Lands Highway Division, which develops a Programming Decisions Committee. The Committee prioritizes projects, establishes selection criteria, and calls for projects. (http://www.cflhd.gov/programs/flap/ut/)

Appendix A

Table 6.6 Regional, State, and Federal Bicycle and Pedestrian Funding Options (Part 5/5)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
FAST Act Safety Program	Safety improvements	States where >15% of fatal crashes involve bicyclists or pedestrians	UDOT	Over the last five years, 17.7% of fatal crashes in Utah have involved bicyclists and/or pedestrians, even though crashes involving these user types are only 2.8% of the total crashes. The FAST Act will create a safety program to fund projects that improve safety for bicyclists and pedestrians, administered through the state DOT.

Table 6.7 Private, Non-Profit, or Corporate Bicycle and Pedestrian Funding Options

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Cambia Health Foundation Children's Health Program	Programs and possibly infrastructure	Projects must improve access to healthy foods, recreation facilities, and encourage healthy behavior for families.	Cambia Health Foundation	Grants are typically in \$50,000 to \$100,000 range. Focus is on programs. Contact foundation staff at cambiahealthfoundation@cambiahealth.org for additional information. (http://www.cambiahealthfoundation.org/programs/childrens-health)
People for Bikes Green Lane Project Grants	Bicycle infrastructure	Projects must improve the bicycling environment	People for Bikes	People for Bikes have awarded 272 grants to non-profit organizations and local governments in 49 states and the District of Columbia, since 1999.
People for Bikes Community Grants	Paths, rail trails, mountain bike trails, bike parks, BMX facilities, large-scale advocacy	Project funding should leverage federal funding and build momentum for bicycling	People for Bikes	People for Bikes have awarded 341 grants, totalling more than \$2.9 million and leveraging nearly \$670 million in public and private funding. This grant program is funded by partners in the bicycle industry.
REI Grants	Preservation and restoration	Non-profit, partner with local store	REI	REI awarded \$4.2 million in grants to more than 300 non-profits for preservation and restoration projects in 650 locations. After a store/non-profit relationship is established, REI asks the non-profit to apply for grant funding. Unsolicited grant applications are usually not considered.
Community Fundraising	All	Small dollar amounts	Local Gov't, agency, or non-profit	Lead agency manages the details, marketing, and range of a community fundraising campaign. Successful examples include use of volunteer labor for path construction near Zion National Park in Springdale, Utah. Follow link below for more ideas. (http://www.bicyclinginfo.org/funding/sources-community.cfm)



Father and daughter riding together on the D&RGW Rail Trail in Kaysville (Photo: Shaunna Burbidge)

7: Conclusion

The Future of Walking & Bicycling in Kaysville

Kaysville possesses incredible potential to be a city that is both friendly to and accessible by bicycling and walking. The City's ability to craft and implement recommendations from past adopted plans will be invaluable to the development of the bicycling and walking system, especially as more people choose to call Kaysville home.

Kaysville's vision for this plan is to "improve quality of life and community health by connecting communities through safe walking and bicycling facilities and programs." This plan will help to bridge the divides between the east and west sides of the city that the public identified as their principal priority during the extensive public involvement process. In addition to improved facilities, like bike lanes, sidewalks, and paths, this plan recommends improving pedestrian and bicyclist connections over major linear barriers, like US-89, Main Street, and Interstate 15.

More than one-third of Kaysville's nearly 30,000 residents are under 16 years old and are largely dependent on parents or caretakers for transportation. Improving on and off-street conditions and increasing connections for walking and riding bicycles will benefit

everyone, but especially Kaysville's youth. Increased rates of walking and bicycling to school alone will mean less congestion and safer connections near schools.

Funding the improvements recommended in this plan over the next 15-20 years will not be the onus of Kaysville residents alone and should not be undertaken all at once. Nearly 30 different funding sources are identified in this plan (in addition to many more that do and will exist in the future at the local, regional, state, and federal level), giving Kaysville diverse options to fund projects within the City. Partnering with UDOT to improve connectivity near, on, and across state roads and highways will also prove to be one particularly important method for cost-savings. Additionally, as land uses change, development occurs, and associated projects are undertaken by partner agencies like UDOT, Davis School District, Davis County, and adjacent municipalities, projects may be implemented more easily and efficiently.

The analyses and recommendations in this plan will allow Kaysville to improve, grow, and develop into a great city for bicycling and walking. Ultimately, the strategies outlined in this plan serve to make bicycling and walking safe, normal, and daily activities in the lives of those living, working, and recreating in Kaysville.

Acronym Key

Acronym	Full Name	Local or National (if applicable)
AASHTO	American Association of State Highway Transportation Officials	National
ACS	American Community Survey	National
ADA	Americans with Disabilities Act	National
ADT	Average Daily Traffic	
APBP	Association of Pedestrian and Bicycle Professionals	National
APWA	America Public Works Association	National
CMAQ	Congestion Mitigation and Air Quality	National and Local
FHWA	Federal Highway Administration	National
GIS	Geographic Information System	
HUD	Department of Housing and Urban Development	National
ITE	Institute of Transportation Engineers	National
LWCF	Land and Water Conservation Fund	National
MPO	Metropolitan Planning Organization	
MUTCD	Manual on Uniform Traffic Control Devices	National and Local
NACTO	National Association of City Transportation Officials	National
NHTS	National Household Travel Survey	National
NICA	National Interscholastic Cycling Association	National and Local
RRFB	Rectangular Rapid Flash Beacon	
SRTS	Safe Routes to School	National
STP	Surface Transportation Program	National
TAP	Transportation Alternatives Program	National
TIP	Transportation Improvement Program	National
TIGER	Transportation Investment Generating Economic Recovery	National
TRB	Transportation Research Board	National
UDOT	Utah Department of Transportation	Local
UTA	Utah Transit Authority	Local
WFRC	Wasatch Front Regional Council	Local



Appendix A: Bicycle & Pedestrian Facility Design Guidelines

KAYSVILLE ACTIVE TRANSPORTATION PLAN

MAY 2016



Appendix A

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Table of Contents

1: Context and Guidance	A-1
Design Needs of Pedestrians	A-4
Pedestrian Crossing Location and Facility Selection....	A-7
Design Needs of Bicyclists.....	A-8
Bicycle Facility Selection Guidelines.....	A-11
Facility Classification	A-12
Facility Continua.....	A-13
Bicycle Facility Contextual Guidance	A-14
2: Pedestrian Crossing Treatments	A-15
Unmarked Crossings	A-16
Marked Crosswalks at Intersections.....	A-17
Marked/Unsignalized Mid-Block Crossings.....	A-18
In Street Pedestrian Crossing Signs.....	A-19
Curb Extensions.....	A-20
Median Refuge Islands.....	A-21
Raised Crosswalks.....	A-22
Pedestrians at Signalized Crossings	A-23
Pedestrian Traffic Signal Enhancements	A-24
Active Warning Beacons (RRFB).....	A-26
Hybrid Beacons.....	A-27
Toucan Signals	A-28
Full Traffic Signal	A-30
Grade-Separated Crossings.....	A-31
3: Shared-use Paths	A-33
General Design Practices	A-34
Shared-Use Paths Along Roadways	A-35
Local Neighborhood Accessways.....	A-36
Shared-use Path Crossings.....	A-37
Bollard and Gate Alternatives at Shared-use Path Crossings	A-38
4: Bicycle Facilities	A-39
Bicycle Boulevards	A-40
Bike Lanes	A-41
Advisory Bicycle Lanes	A-42
Buffered Bike Lanes.....	A-43
One-Way Separated (or Protected) Bike Lanes....	A-44
Two-Way Separated (or Protected) Bike Lanes....	A-45
Separated Bike Lane Protection Methods	A-46
5: Bicycle Signs and Markings	A-47
Wayfinding Sign Types.....	A-48
Wayfinding Sign Placement.....	A-49
Regulatory and Warning Signs	A-50
6: Bicyclists at Intersections and Crossings.	A-51
Intersection Crossing Markings	A-52
Combined Bike Lane / Turn Lane.....	A-53
Bike Lanes at Right Turn Only Lanes.....	A-54
Bike Box	A-55
Two-Stage Turn Boxes	A-56
Bicycle Signal Heads	A-57
7: Bicycles and Pedestrians at Interchanges.	A-59
Channelized Turn Lanes	A-60
Bike Lanes at Entrance Ramps.....	A-61
Bike Lanes at Exit Ramps.....	A-62
Diverging Diamond Interchange (DDI) Design ...	A-63
Single Point Urban Interchange (SPUI) Design	A-64
8: Traffic Calming	A-65
Vertical Traffic Calming.....	A-66
Horizontal Traffic Calming.....	A-67
Traffic Diversion	A-68

Appendix A

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Denver & Rio Grande Western Rail Trail (shared-use path) near 200 North in Kaysville (Photo: Shaunna Burbidge)

1: Context and Guidance

Introduction

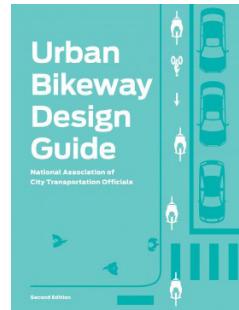
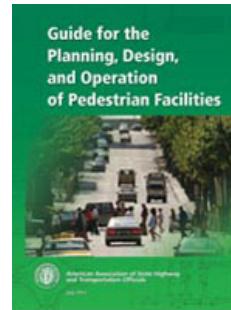
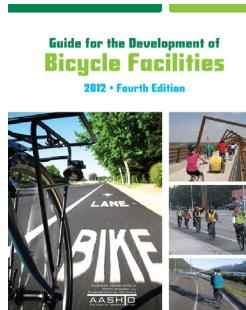
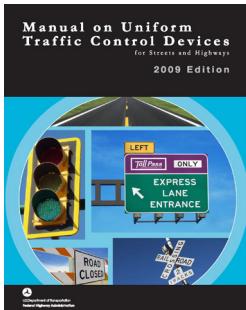
This technical handbook is intended to assist Kaysville City in the selection and design of bicycle and pedestrian facilities. The following sections combine best practices and design guidance provided by a number of national sources including ITE, NCHRP, FHWA, and NACTO. Within the design chapters, treatments are covered within a single or double sheet format relaying important design information and discussion, example photos, schematics (if applicable), and existing summary guidance from current or upcoming draft standards. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.

Guiding Principles

The following are guiding principles for these bicycle and pedestrian design guidelines:

- The walking and bicycling environment should be safe and comfortable. Safe means minimal conflicts with external factors, such as noise, vehicular traffic and protruding architectural elements. Safe also means routes are clear and well marked with appropriate pavement markings and directional signage.
- The trail and bicycle network should be accessible. Shared-use paths, bike routes and crosswalks should permit the mobility of residents of all ages and abilities. The trail and bicycle network should employ principles of universal design. Bicyclists have a range of skill levels, and facilities should be designed with a goal of providing for inexperienced/recreational bicyclists (especially children and seniors) to the greatest extent possible.
- Trail and bicycle network improvements should be economical. Trail and bicycle improvements should achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as a reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.
- The trail and bicycle network should connect to places people want to go. The trail and bicycle network should provide continuous direct routes and convenient connections between destinations such as homes, schools, shopping areas, public services, recreational opportunities and transit. A complete network of on-street bicycling facilities should connect seamlessly to existing and proposed shared-use paths to complete recreational and commuting routes.
- The walking and bicycling environment should be clear and easy to use. Shared-use paths and

Appendix A



crossings should allow all people to easily find a direct route to a destination with minimal delays, regardless of whether these persons have mobility, sensory, or cognitive disability impairments. All roads are legal for the use of pedestrians and bicyclists (except freeways, from which each is prohibited unless a separate facility on that right of way is provided). This means that most streets are bicycle facilities and should be designed, marked and maintained accordingly.

- The walking and bicycling environment should be attractive and enhance community livability. Good design should integrate with and support the development of complementary uses and should encourage preservation and construction of art, landscaping and other items that add value to the community. These components might include open spaces such as plazas, courtyards and squares, and amenities like street furniture, banners, art, plantings and special paving. These along with historical elements and cultural references, should promote a sense of place.
- Design guidelines are flexible and should be applied using professional judgment. This document references specific national guidelines for bicycle and trail facility design, as well as a number of design treatments not specifically covered under current guidelines. Statutory and regulatory guidance may change. For this reason, the guidance and recommendations in this document function to complement other resources considered during a design process, and in all cases sound engineering judgment should be used.

National Standards

The Federal Highway Administration's **Manual on Uniform Traffic Control Devices** (MUTCD) defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

To further clarify the MUTCD, the FHWA created a table of contemporary bicycle facilities that lists various bicycle-related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). See **Bicycle Facilities and the Manual on Uniform Traffic Control Devices**.

Bikeway treatments not explicitly covered by the MUTCD are often subject to experiments, interpretations and official rulings by the FHWA. The **MUTCD Official Rulings** is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available on this website.

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities**, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities. The standards and guidelines presented by AASHTO provide basic information, such as minimum sidewalk widths, bicycle

lane dimensions, detailed striping requirements and recommended signage and pavement markings.

The National Association of City Transportation Officials' (NACTO) 2012 **Urban Bikeway Design Guide** offers guidance on the current state of the practice designs. The NACTO Urban Bikeway Design Guide is based on current practices in the best cycling cities in the world. The intent of the guide is to offer substantive guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right of way present unique challenges. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

FHWA's 2015 **Separated Bike Lane and Planning Design Guide** is the newest publication of nationally recognized bicycle-specific design guidelines, and outlines planning considerations for separated bike lanes, presents a suite of design recommendations based on corridor context, and highlights notable case studies from across the US.

Some of these treatments are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

Local Standards

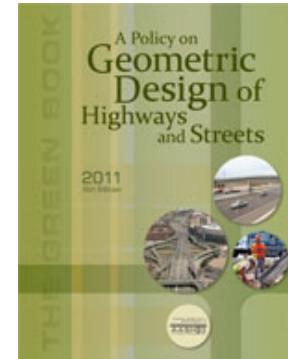
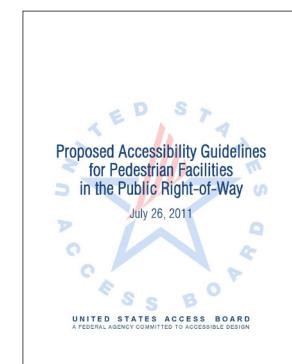
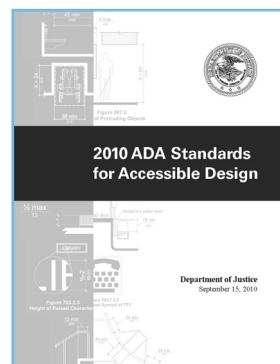
The Utah Department of Transportation's (UDOT) **Pedestrian and Bicycle Guide** provides design guidance and maintenance best practices for pedestrian and bicycle facilities. It also includes resources on funding, education and enforcement, and UDOT's project development process. The 2014 **State Bike Plan** incorporated a route condition inventory and safety gap analysis for each UDOT urban region and identified a regional bicycle network that includes key connections to transit and existing bicycle facilities as part of the Utah Collaborative

Active Transportation Study. Kaysville is located in UDOT Region 1.

Additional US Federal Guidelines

Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project. The United States Access Board's proposed **Public Rights-of-Way Accessibility Guidelines** (PROWAG) and the **2010 ADA Standards for Accessible Design** (2010 Standards) contain standards and guidance for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slope requirements, and pedestrian railings along stairs.

The 2011 AASHTO: **A Policy on Geometric Design of Highways and Streets** commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.



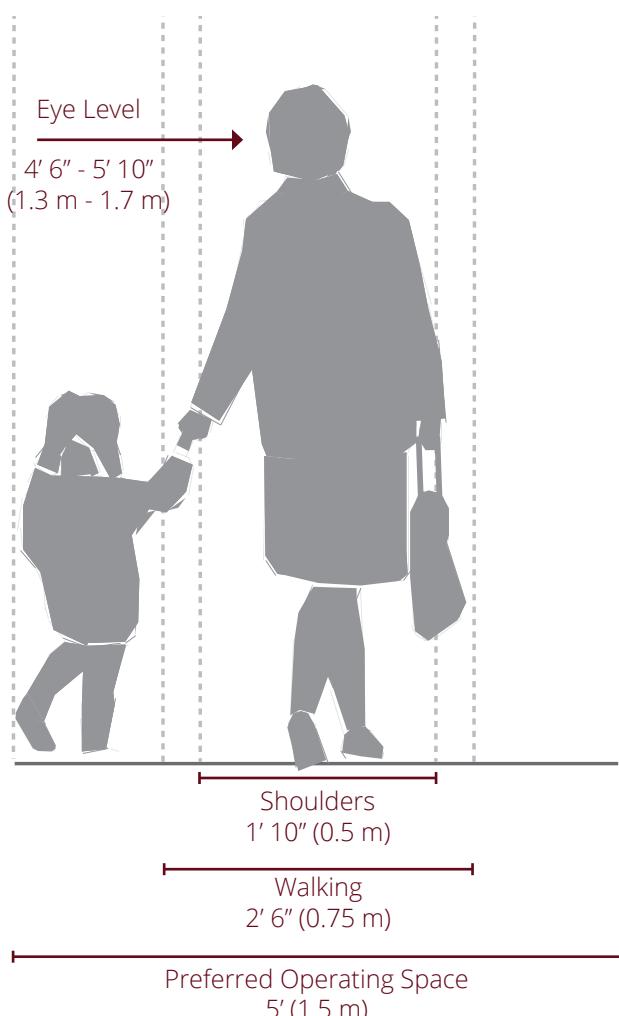
Design Needs of Pedestrians

Types of Pedestrians

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. The table below summarizes

common pedestrian characteristics for various age groups.

The MUTCD recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.



Pedestrian Characteristics by Age

Age	Characteristics
0-4	Learning to walk Requires constant adult supervision Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision Poor depth perception
9-13	Susceptible to "darting out" in roadways Insufficient judgment Sense of invulnerability
14-18	Improved awareness of traffic environment Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street Vision loss Difficulty hearing vehicles approaching from behind

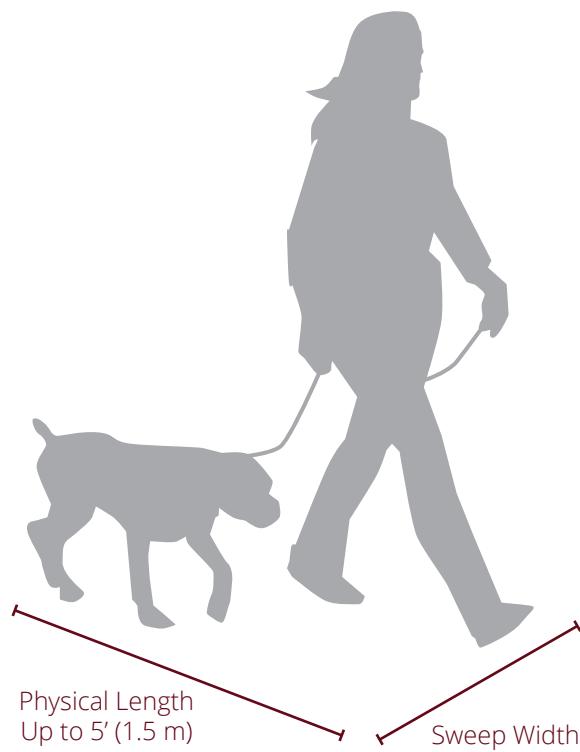
Source: AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, Exhibit 2-1. 2004.

Design Needs of Pedestrians

Design Needs of Dog Walkers

Dog walking is a common and anticipated use on shared-use paths. Dog sizes vary largely, as does leash length and walking style, leading to wide variation in possible design dimensions.

Shared-use paths designed to accommodate wheelchair users are likely to provide the necessary dimensions for the average dog walker. Amenities such as dog waste stations may enhance conditions for dog walkers.



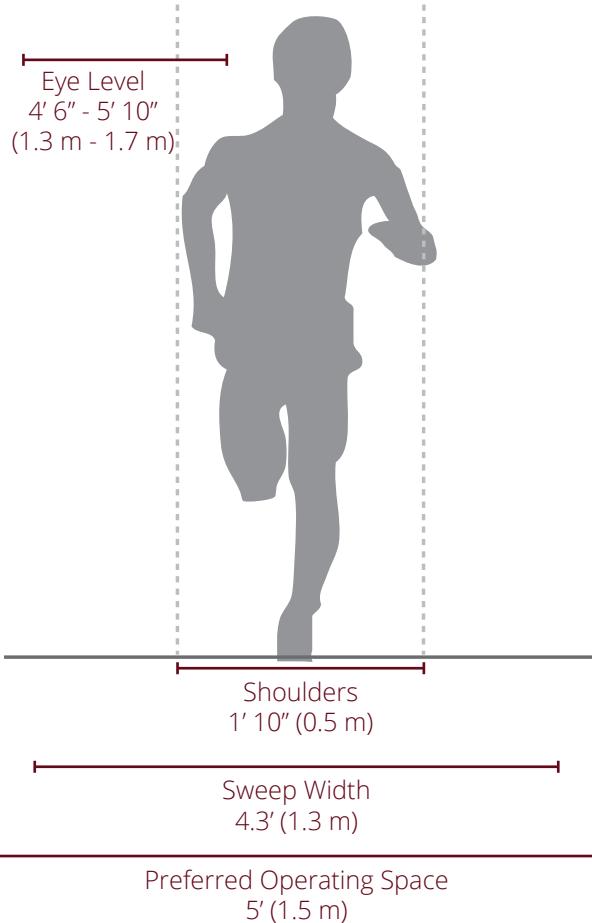
Source: FHWA. *Characteristics of Emerging Road and Trail Users and Their Safety*. (2004).

Design Needs of Runners

Running is an important recreation and fitness activity commonly performed on shared-use paths. Many runners prefer softer surfaces (such as rubber, bare earth or crushed rock) to reduce impact. Runners can change their speed and direction frequently. If high volumes are expected, controlled interaction or separation of different types of users should be considered.

Runner Typical Speed

User	Typical Speed
Runner	6.2 mph



Design Needs of Pedestrians

Design Needs of Wheelchair Users

As the American population ages, the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs use battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick or breath controlled).

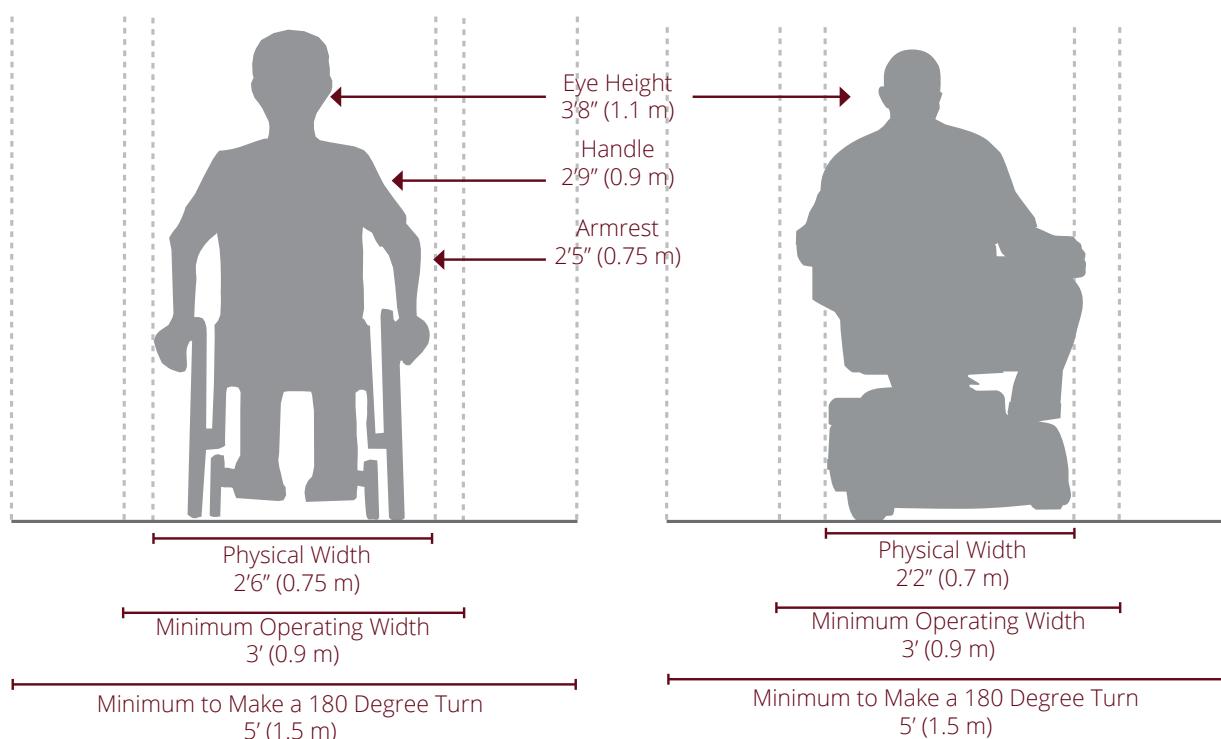
Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element for accessible design.

Wheelchair User Typical Speed

User	Typical Speed
Manual Wheelchair	3.6 mph
Power Wheelchair	6.8 mph

Design Considerations

Effect on Mobility	Design Solution
Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
Require wider path of travel.	Sufficient width and maneuvering space.



Source: FHWA. *Characteristics of Emerging Road and Trail Users and Their Safety*. 2004.
USDOJ. *2010 ADA Standards for Accessible Design*. 2010.

Pedestrian Crossing Location and Facility Selection

Mid-block Crossings

Mid-block crossings are an important street design element for pedestrians. They can provide a legal crossing at locations where pedestrians want to travel, and can be safer than crossings at intersections because traffic is only moving in two directions. Locations where mid-block crossings should be considered include:

- Long blocks (longer than 600 ft) with destinations on both sides of the street.
- Locations with heavy pedestrian traffic, such as schools, shopping centers.
- At mid-block transit stops, where transit riders must cross the street on one leg of their journey.

Crossing Treatment Selection

The specific type of treatment at a crossing may range from a simple marked crosswalk to full traffic signals or grade separated crossings. Crosswalk lines should not be used indiscriminately, and appropriate selection of crossing treatments should be evaluated in an engineering study should be performed before a marked crosswalk is installed. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE At unsignalized locations		Local Streets 15-25 mph			Collector Streets 25-30 mph			Arterial Streets 30-45 mph						
FACILITY TYPE		2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
Crosswalk Only (high visibility)		✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
Crosswalk with warning signage and yield lines		EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
Active Warning Beacon (RRFB)		X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
Hybrid Beacon		X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal		X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade separation		X	X	EJ	EJ	EJ	X	EJ	EJ	EJ	EJ	EJ	✓	✓

LEGEND

Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X



Design Needs of Bicyclists

The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers. Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

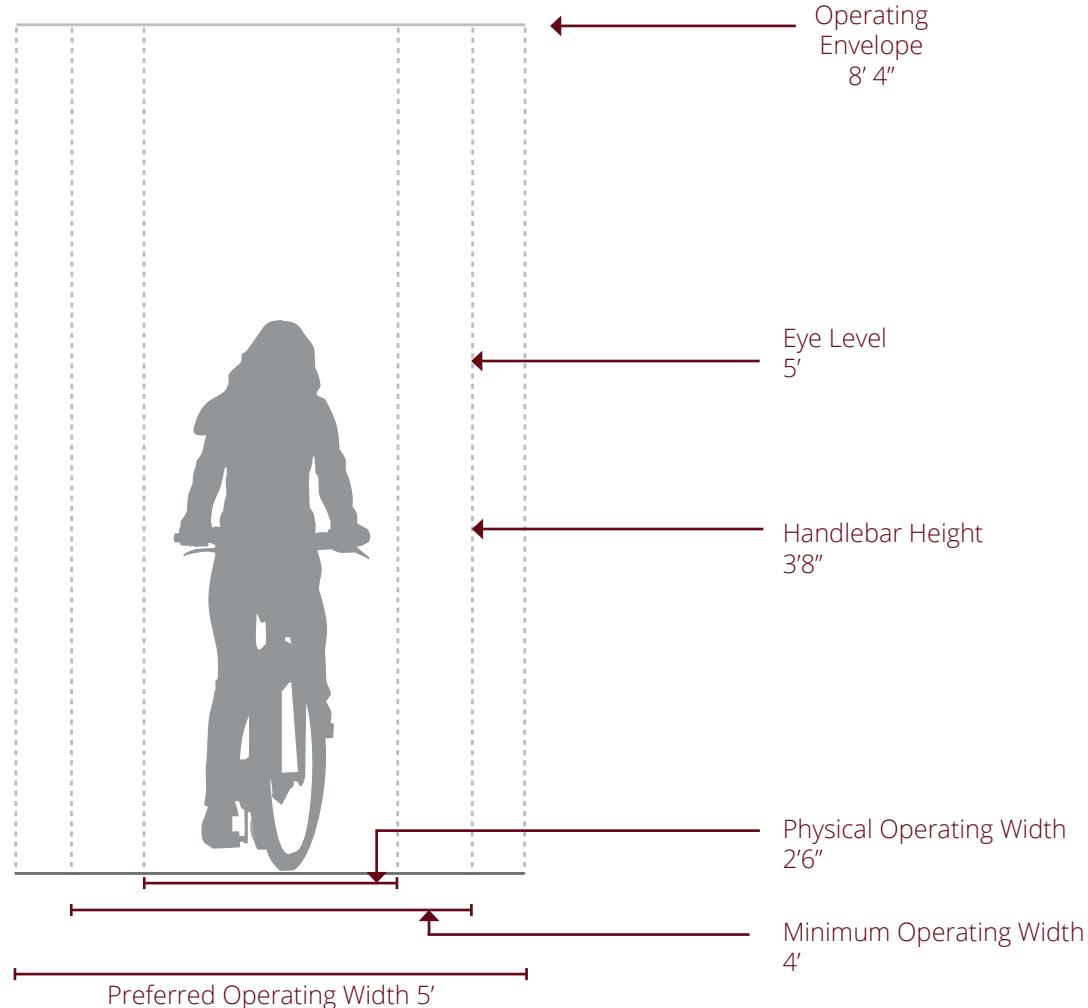
Bicycle as a Design Vehicle

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should

consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

The figure below illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the

Standard Bicycle Rider Dimensions



Source: AASHTO Guide for the Development of Bicycle Facilities, 4th Edition, 2012.

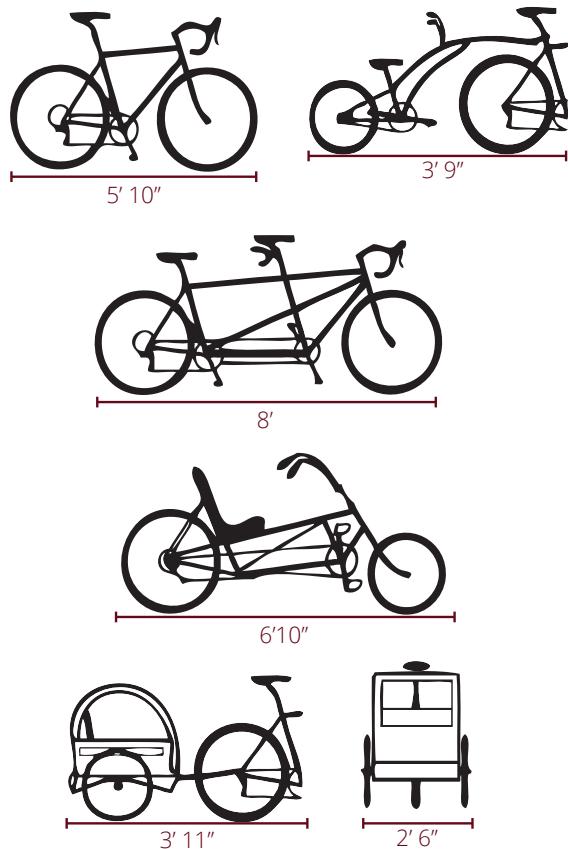
Design Needs of Bicyclists

physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure below and table at right summarize the typical dimensions for bicycle types.

Design Speed Expectations

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared-use paths. The table at right provides typical bicyclist speeds for a variety of conditions.



Bicycle as Design Vehicle - Typical Dimensions

Source: AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition *AASHTO does not provide typical dimensions for tricycles.

Bicycle as Design Vehicle - Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	15 mph
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 - 12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

*Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.

Bicycle as Design Vehicle - Typical Dimensions

Bicycle Type	Feature	Typical Dimensions
Upright Adult Bicyclist	Physical width	2 ft 6 in
	Operating width (Minimum)	4 ft
	Operating width (Preferred)	5 ft
	Physical length	5 ft 10 in
	Physical height of handlebars	3 ft 8 in
	Operating height	8 ft 4 in
	Eye height	5 ft
	Vertical clearance to obstructions (tunnel height, lighting, etc)	10 ft
	Approximate center of gravity	2 ft 9 in - 3 ft 4 in
	Physical length	8 ft
Recumbent Bicyclist	Eye height	3 ft 10 in
	Physical length	8 ft
Tandem Bicyclist	Physical length	8 ft
Bicyclist with child trailer	Physical length	10 ft
	Physical width	2 ft 6 in

Design Needs of Bicyclists

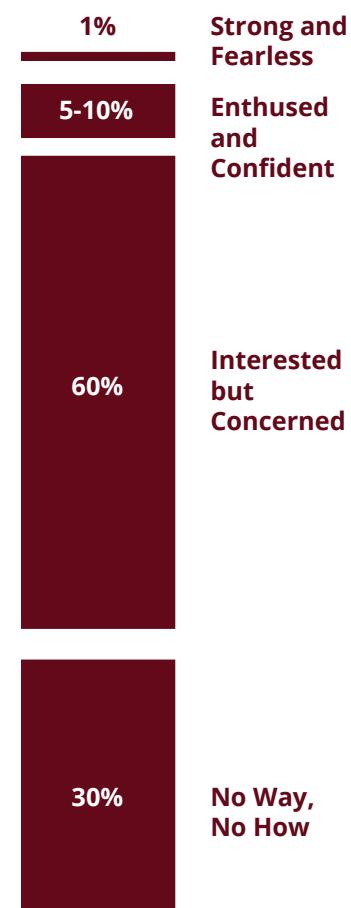
Types of Bicyclists

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in on-street bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people.

The bicycle planning and engineering professions currently use several systems to classify the population which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The current AASHTO Guide to the Development of Bicycle Facilities encourages designers to identify their rider type based on the trip purpose (Recreational vs. Transportation) and on the level of comfort and skill of the rider (Causal vs. Experienced). A more detailed framework for understanding of the US population's relationship to transportation focused bicycling is illustrated in the figure at right. Developed by planners in Portland, OR¹ and supported by research², this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- Strong and Fearless (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared-use paths.
- Enthused and Confident (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreational riders, racers and utilitarian bicyclists.
- Interested but Concerned (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.
- No Way, No How (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

Typical Distribution of Bicyclist Types



¹ Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. <http://www.portlandonline.com/transportation/index.cfm?a=237507>. 2009.

² Dill, J., McNeil, N. *Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential*. 2012.

Bicycle Facility Selection Guidelines

The specific bicycle facility type that should be provided depends on the surrounding environment (e.g. auto speed and volume, topography, and adjacent land use) and expected bicyclist needs (e.g. bicyclists commuting on a highway versus students riding to school on residential streets).

Facility Selection Guidelines

There are no 'hard and fast' rules for determining the most appropriate type of bicycle facility for a particular location – roadway speeds, volumes, right-of-way width, presence of parking, adjacent land uses, and expected bicycle user types are all critical elements of this decision. Studies find that the most significant

factors influencing bicycle use are motor vehicle traffic volumes and speeds. Additionally, most bicyclists prefer facilities separated from motor vehicle traffic or located on local roads with low motor vehicle traffic speeds and volumes. Because off-street pathways are physically separated from the roadway, they are perceived as safe and attractive routes for bicyclists who prefer to avoid motor vehicle traffic. Consistent use of treatments and application of bikeway facilities allow users to anticipate whether they would feel comfortable riding on a particular facility, and plan their trips accordingly. This section provides guidance on various factors that affect the type of facilities that should be provided.

Facility Classification

Description

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared Roadways are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.

Shared roadways may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such treatments often are associated with **Bicycle Boulevards**.

On-Street Bikeways, such as conventional or buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.

Another variant of on-street bikeway is **Separated Bike Lanes** which are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.

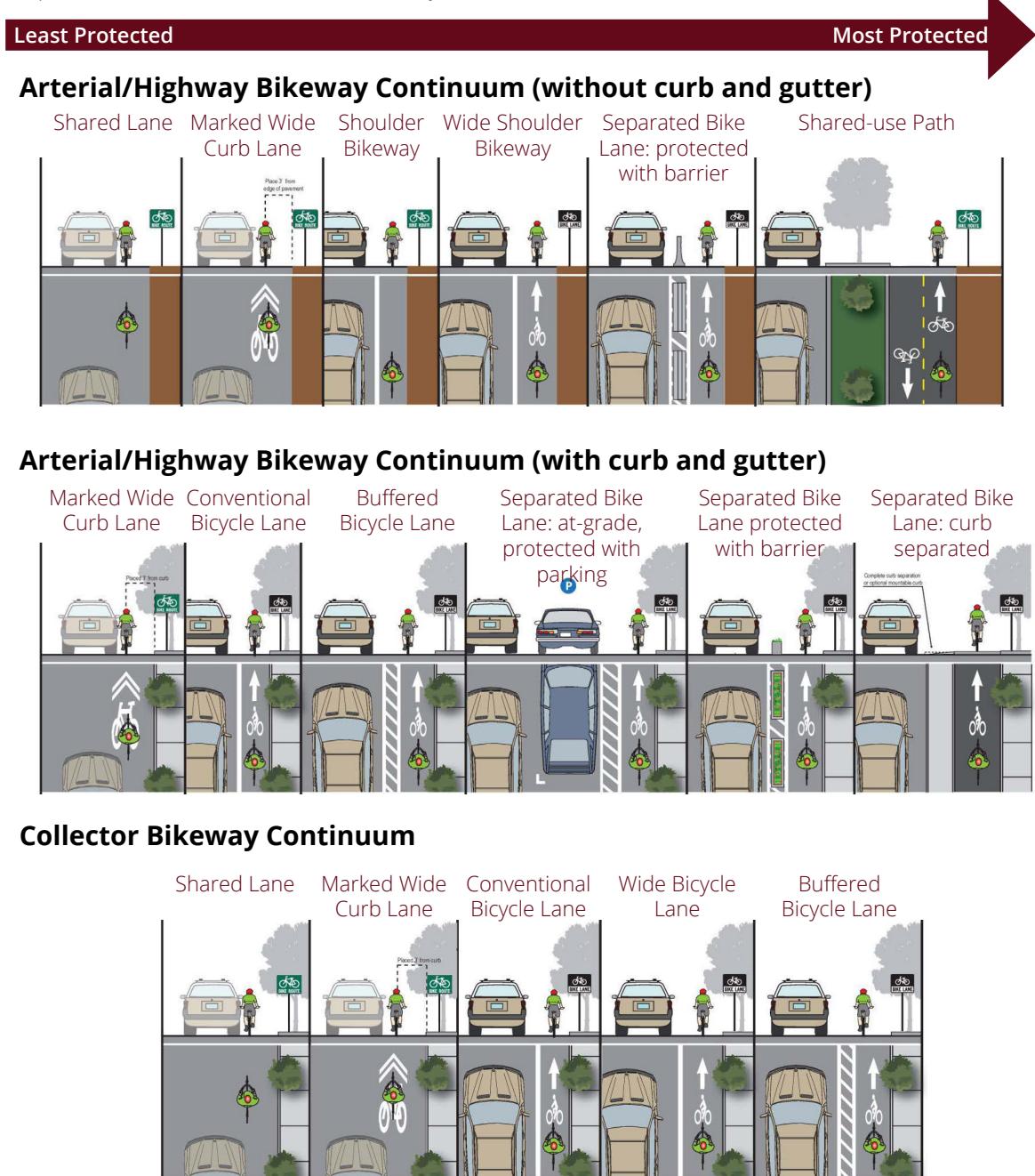
Shared-use Paths are facilities separated from roadways for use by bicyclists and pedestrians.



Facility Continua

The following continua illustrate the range of bicycle facilities applicable to various roadway environments, based on the roadway type and desired degree of separation. Engineering judgment, traffic studies, previous municipal planning efforts, community input and local context should be used to refine criteria when developing bicycle facility recommendations for a particular street. In some corridors, it may be

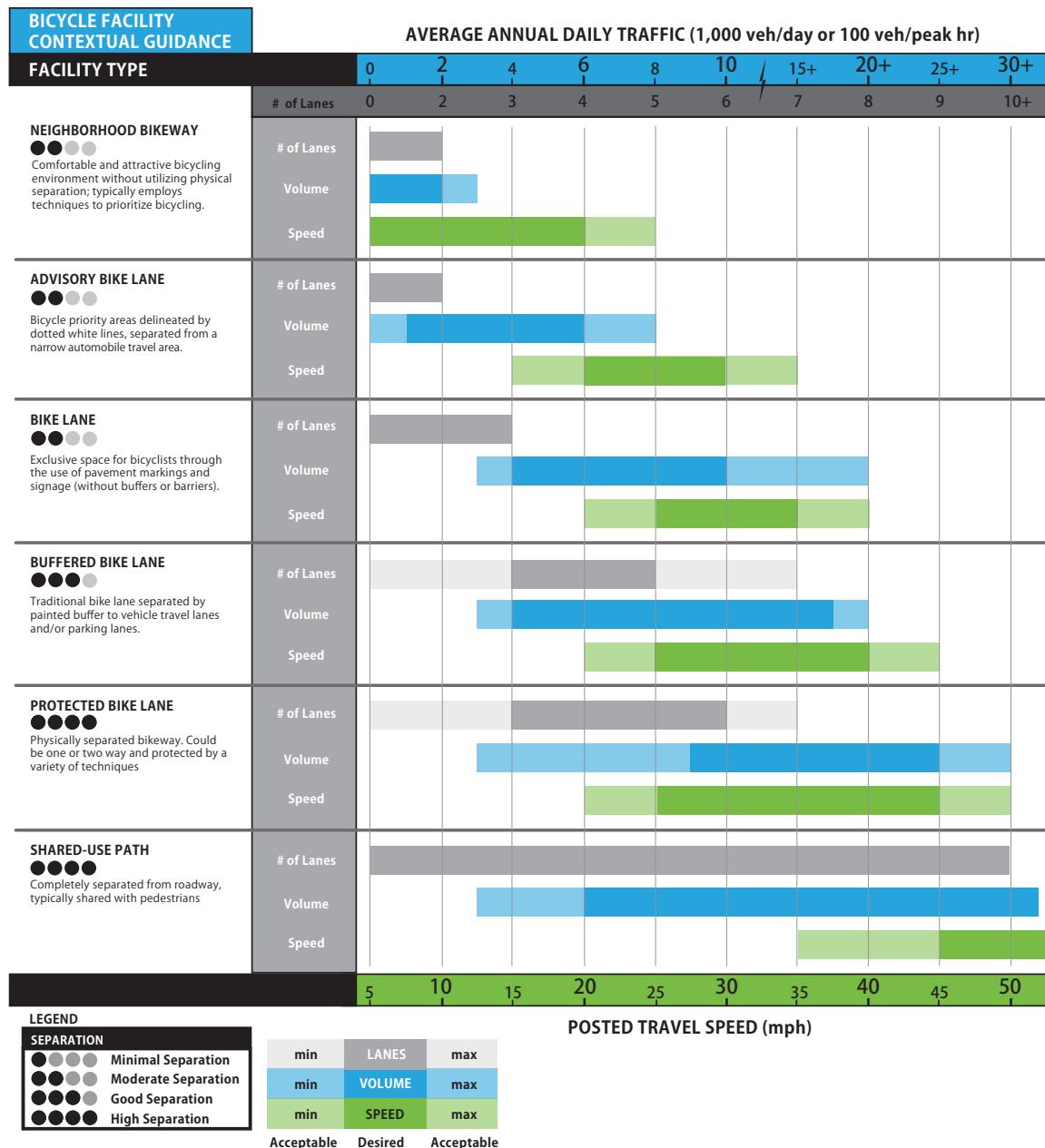
desirable to construct facilities to a higher level of treatment than those recommended in relevant planning documents in order to enhance user safety and comfort. In other cases, existing and/or future motor vehicle speeds and volumes may not justify the recommended level of separation, and a less intensive treatment may be acceptable.



Bicycle Facility Contextual Guidance

Due to the range of factors that influence bicycle users' comfort and safety, selecting the best bicycle facility type for a given roadway can be challenging. There is a significant impact on cycling comfort when the speed differential between bicyclists and motor vehicles is high and when traffic volumes and speeds are also high. The chart below can help to determine the type of bikeway best suited for particular configurations, speeds, and volumes. To use this chart,

identify the number of lanes, daily traffic volume, and travel speed, and locate the facility types indicated by those key variables. Other factors beyond speed and volume that are not included in the chart below but that still affect facility selection include traffic mix of heavy vehicles, on-street parking, intersection density, surrounding land use, and roadway sight distance. These additional factors should be considered in the facility selection and design process.





A pedestrian crossing with a median refuge island near Snow Horse Elementary in Kaysville (Photo: Shaunna Burbidge)

2: Pedestrian Crossing Treatments

Introduction

Attributes of pedestrian-friendly intersection design include:

Clear Space: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

Visibility: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

Legibility: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

Accessibility: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.

Separation from Traffic: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.

Lighting: Adequate lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, suburban and rural intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.

Crossing beacons and signals facilitate crossings of roadways for pedestrians. Beacons make crossing intersections safer by clarifying when to enter an intersection and by alerting motorists to the presence of pedestrians.

Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Signage and pavement markings may be used to highlight these facilities for pedestrians, bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, traffic volumes, lane configuration, presence of a median or refuge, and the anticipated levels of pedestrian and bicycle crossing traffic.

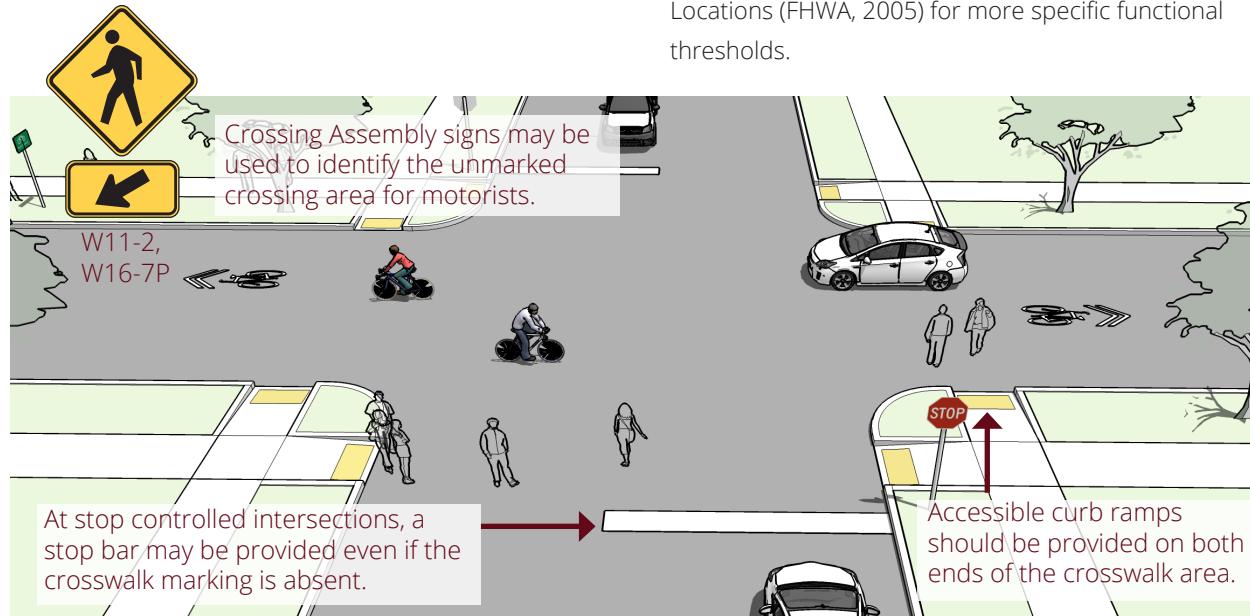
An intersection with crossing beacons may reduce stress and delays for a crossing users, and discourage illegal and unsafe crossing maneuvers.

Unmarked Crossings

Description

Crosswalks exists at the corners of roadway intersections, whether they are marked or unmarked. An unmarked crosswalk is the area defined by the edges of the sidewalk. This area is absent of crosswalk markings, though other related traffic control markings may be present.

Unmarked crosswalks area not applicable at mid-block locations. Crosswalk pavement markings must be used to formally establish the crosswalk in these areas.



Discussion

The Uniform Vehicle Code requires that motorists yield right-of-way to pedestrians in marked and unmarked crosswalks. The UVC is ambiguous about whether an unmarked crosswalk exists at intersections where no sidewalk are present.

If a pedestrian is 700 feet or farther from a formal pedestrian crossing they may cross mid-block at any location, but they must yield to motor vehicles. At mid-block crossings, a yield line may be provided even if the crosswalk marking itself is absent.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.

FHWA. *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations*. 2005.

Guidance

Unmarked crosswalks are most comfortable on streets with:

- One lane in each direction
- Motor vehicle speeds of 25 mph or lower
- Motor vehicle volumes of 3,000 ADT or lower

Unmarked crosswalks may operate safely at locations with higher speeds and volumes than noted above, but may result in uncomfortable conditions and discourage pedestrian activity. See *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations* (FHWA, 2005) for more specific functional thresholds.

Materials and Maintenance

Unmarked crosswalks should be maintained free of debris. Surrounding landscaping should be maintained to not negatively impact sight lines.

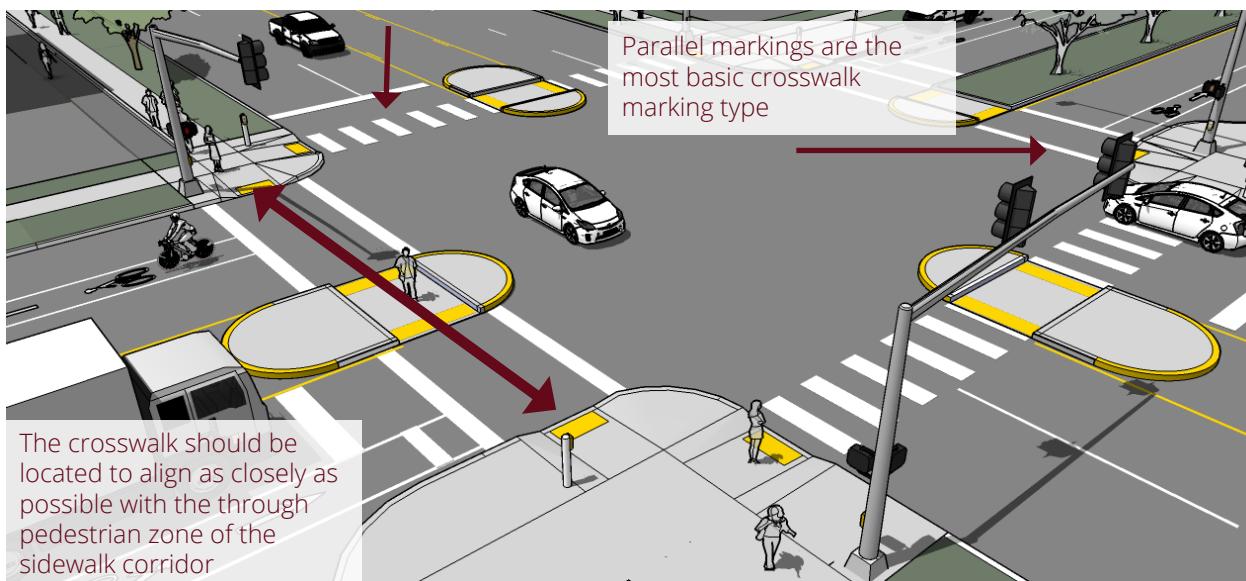
Marked Crosswalks at Intersections

Description

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer especially on multi-lane roadways.

At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Continental markings provide additional visibility



Discussion

Continental crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections where there is expected high pedestrian use and the crossing is not controlled by signals or stop signs. See intersection signalization for a discussion of enhancing pedestrian crossings.

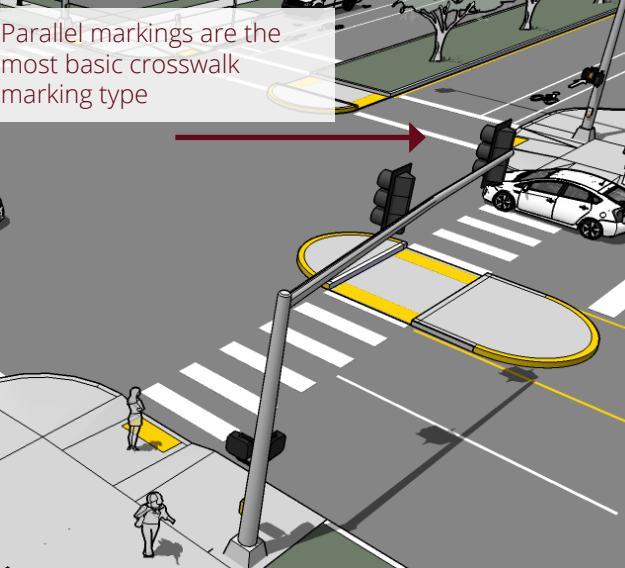
Additional References and Guidelines

- FHWA. *Manual on Uniform Traffic Control Devices*. (3B.18). 2009.
- AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
- FHWA. *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations*. 2005.
- FHWA. *Crosswalk Marking Field Visibility Study*. 2010.
- NACTO. *Urban Street Design Guide*. 2013.

Guidance

At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:

- In downtowns or other high pedestrian activity centers
- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.



Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability than conventional paint.

Marked/Unsignalized Mid-Block Crossings

Description

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Detectable warning strips help visually impaired pedestrians identify the edge of the street

Advance stop lines should be placed 20-50 feet in advance of multi-lane uncontrolled mid-block crossings

Guidance

Maximum traffic volumes

- $\leq 9,000$ -12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed

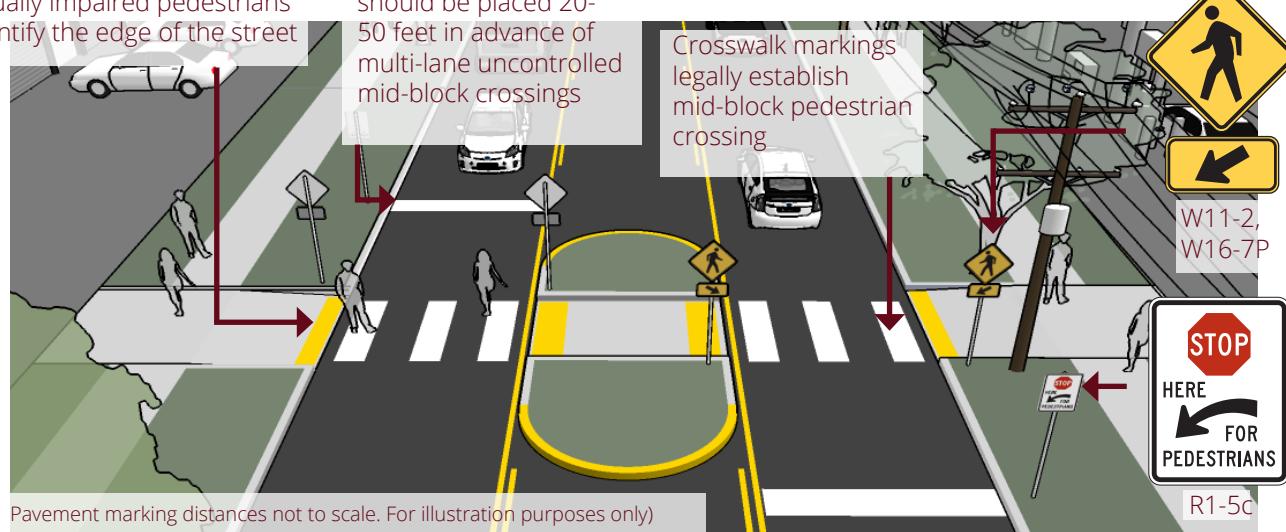
- 35 MPH

Maximum number of lanes

- 3 lanes with a refuge

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet



Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons or in-pavement flashers, and excellent sight distance. For more information see the discussion of active warning beacons. On roadways with low to moderate traffic volumes ($<12,000$ ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.

Materials and Maintenance

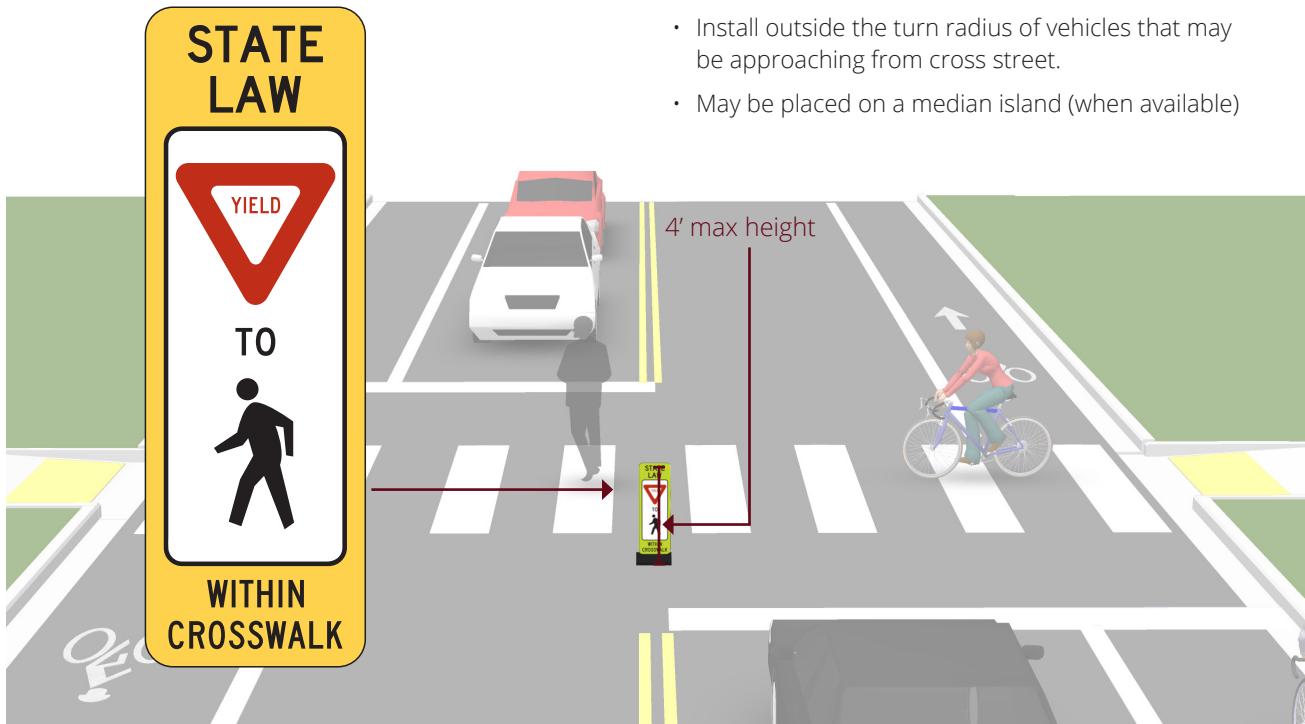
Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

In Street Pedestrian Crossing Signs

Description

In-street pedestrian crossing signs are attached to a flexible plastic bollard on the center line of the roadway. They are used to reinforce the presence of crosswalks and remind motorists of their legal obligation to yield for pedestrians in marked or unmarked crosswalks. This signage is often placed at high-volume pedestrian crossings that are not signalized.

R1-6



Discussion

These flexible signs must be extremely durable to withstand potential impacts with motor vehicles. Semi-permanent installations are also possible when the sign is combined with a moveable base. This allows for day-time only applications. On multi-lane roadways, consider active warning beacons for improved yielding compliance.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices*. 2012.
 Redmon, Tamara. *Evaluating Pedestrian Safety Countermeasures*. Public Road. 2011.
 Hua, Jenna. *San Francisco PedSafe II Project Outcomes and Lessons Learned*. TRB Annual Meeting. 2009.

Guidance

- The in-street pedestrian crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island.
- The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement or median island surface.
- The signs perform better on narrow roadways, where the visibility of the signs is maximized
- Install in a manner that does not impede pedestrian flow.
- Install outside the turn radius of vehicles that may be approaching from cross street.
- May be placed on a median island (when available)

Materials and Maintenance

Unless the In-Street Pedestrian Crossing sign is placed on a physical island, the sign support shall be designed to bend over and then bounce back to its normal vertical position when struck by a vehicle.

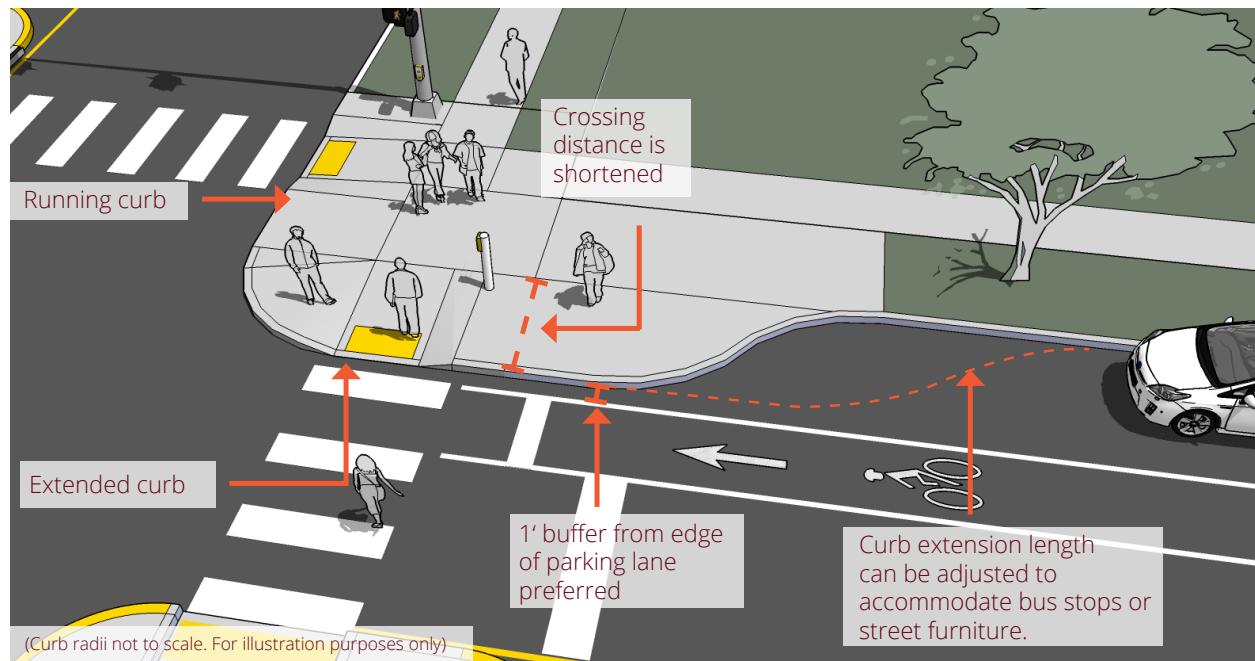
Curb Extensions

Description

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

Guidance

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.



Discussion

If there is no parking lane, adding curb extensions may be a problem for bicycle travel and truck or bus turning movements. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
AASHTO. *A Policy on Geometric Design of Highways and Streets*. 2004.
NACTO. *Urban Street Design Guide*. 2013.

Materials and Maintenance

Planted curb extensions may be designed as a bioswale, a vegetated system for storm water management.

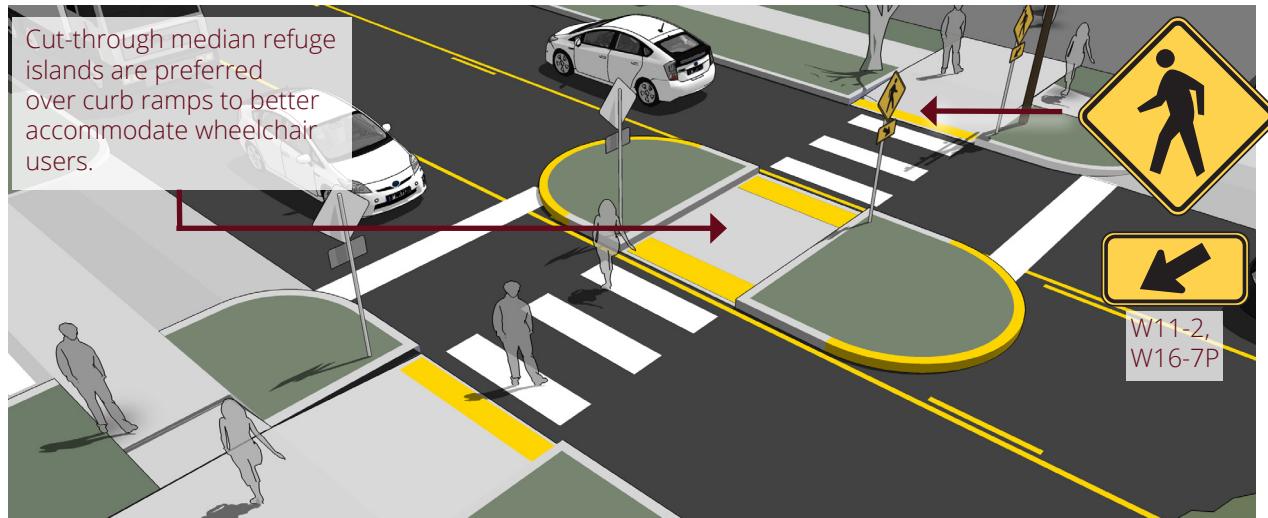
Median Refuge Islands

Description

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

Guidance

- Can be applied on any roadway with a left turn center lane or median that is at least 6' wide.
- Appropriate at signalized or unsignalized crosswalks
- The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.
- The island should be at least 6' wide between travel lanes (to accommodate bikes with trailers and wheelchair users) and at least 20' long.
- On streets with speeds higher than 25 mph there should also be double center line marking, reflectors, and "KEEP RIGHT" signage.



Discussion

If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Shrubs and ground plantings should be no higher than 1 ft 6 in. On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
NACTO. *Urban Bikeway Design Guide*. 2012.
NACTO. *Urban Street Design Guide*. 2013.

Materials and Maintenance

Refuge islands may collect road debris and may require somewhat frequent maintenance. Refuge islands should be visible to snow plow crews and should be kept free of snow berms that block access.

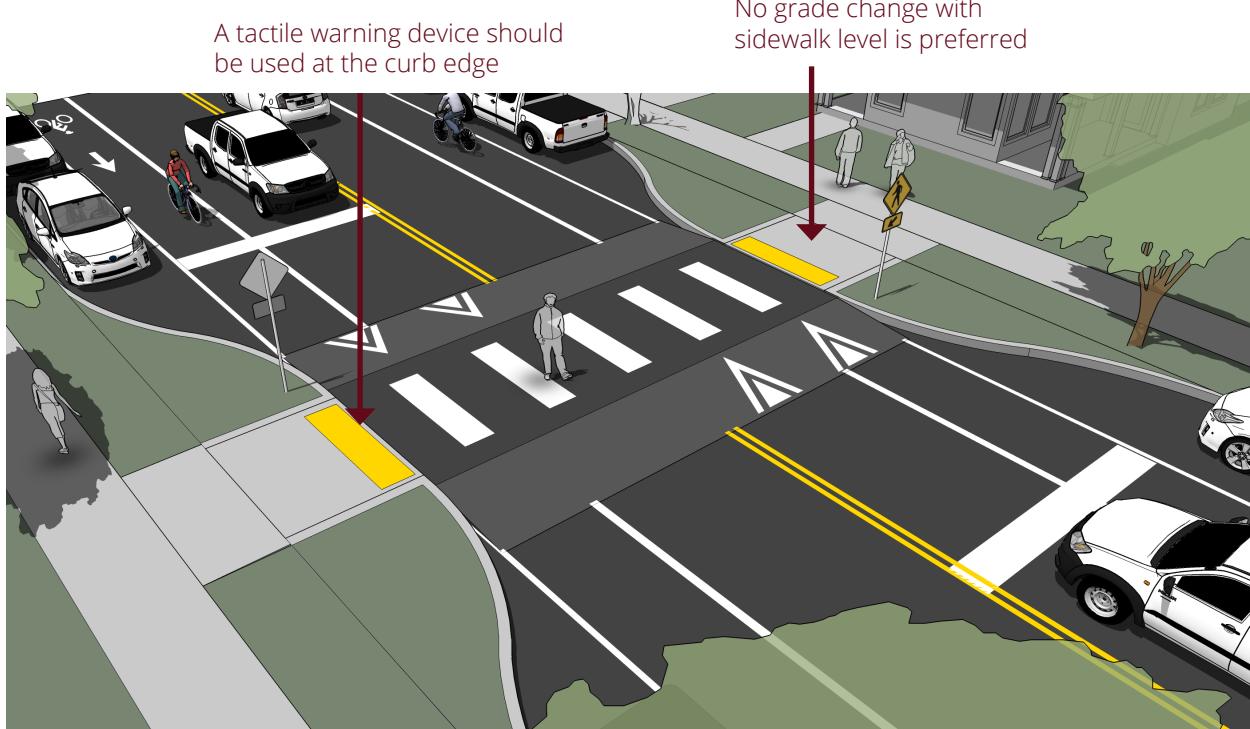
Raised Crosswalks

Description

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used only in very limited cases where a special emphasis on pedestrians is desired; review on case-by-case basis.

Guidance

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.
- Approaches to the raised crosswalk may be designed to be similar to speed humps.
- Raised crosswalks can also be used as a traffic calming treatment.



Discussion

Like a speed hump, raised crosswalks have a traffic slowing effect which may be unsuitable on emergency response routes. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. (3B.18). 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
USDOJ. *ADA Standards for Accessible Design*. 2010.
NACTO. *Urban Street Design Guide*. 2013.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

Pedestrians at Signalized Crossings

Description

Pedestrian Signal Head

Pedestrian signal heads indicate to pedestrians when to cross at a signalized crosswalk. Pedestrian signal indications are recommended at all traffic signals except where pedestrian crossing is prohibited.

Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all new and rehabbed signalized intersections

Signal Timing

Adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street. The MUTCD recommends a walking speed of 3.5 ft per second.

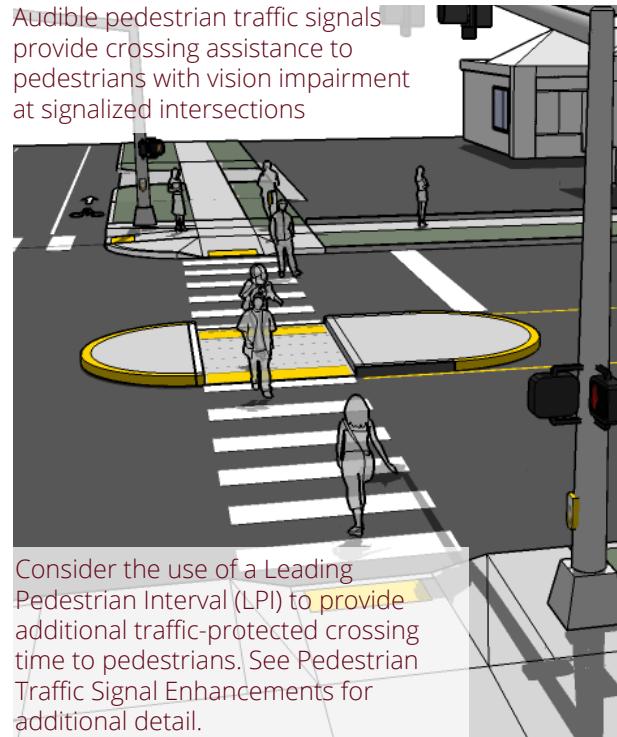
At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3 ft per second should be assumed. Special pedestrian phases can be used to provide greater visibility or more crossing time for pedestrians at certain intersections (See Pedestrian Traffic Signal Enhancements).

Large pedestrian crossing distances can be broken up with median refuge islands. A pedestrian push-button can be provided on the median to create a two-stage pedestrian crossing if the pedestrian phase is actuated. This ensures that pedestrians are not stranded on the median, and is especially applicable on large, multi-lane roadways with high vehicle volumes, where providing sufficient pedestrian crossing time for a single stage crossing may be an issue.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG)*. 2011.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
NACTO. *Urban Street Design Guide*. 2013.

Audible pedestrian traffic signals provide crossing assistance to pedestrians with vision impairment at signalized intersections



Consider the use of a Leading Pedestrian Interval (LPI) to provide additional traffic-protected crossing time to pedestrians. See Pedestrian Traffic Signal Enhancements for additional detail.

Discussion

Push-buttons should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk. Push-buttons should be marked (for example, with arrows) so that it is clear which signal is affected. In areas with very high pedestrian volumes, consider an all-pedestrian signal phase, also known as a Pedestrian Scramble or Barnes Dance, to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped, including diagonally in some cases. This greatly reduces pedestrian and vehicle conflicts, but does make for a longer signal cycle length. Right turns on red must not be permitted in conjunction with an exclusive pedestrian phase.

Materials and Maintenance

It is important to repair or replace traffic control equipment before it fails. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and loop detectors.

Pedestrian Traffic Signal Enhancements

Description

Pedestrian-vehicle conflicts can occur when drivers performing turning movements across the crosswalk do not see or yield to pedestrians who have the right-of-way. Pedestrians may also arrive at an intersection late, or may not have any indication of how much time they have to safely cross the intersection. Pedestrian traffic signal enhancements can be made to provide pedestrians with a safe crossing environment.

Guidance

Pedestrian recall is a traffic signal controller setting that automatically provides a pedestrian walk phase during every cycle. Since Pedestrian recall does not require detection or actuation, it eliminates the need for push buttons or other costly detection equipment. This makes pedestrian crossings predictable, minimizes unnecessary pedestrian delay, and does not leave pedestrians wondering whether they have been detected or not. The most appropriate use of pedestrian recall is in locations and/or times of day with high pedestrian volumes.

Push buttons can be configured to provide additional crossing time when pedestrians arrive at the crossing during the flashing don't walk interval. The MUTCD requires signage indicating the walk time extension at or adjacent to the push button (R10-32P).

Passive pedestrian detection devices save pedestrians the trouble of having to locate a push button. They are also capable of tracking pedestrians as they cross the intersection, and can be configured to extend the walk/flashing don't walk interval when pedestrians are still in the intersection, and/or not dedicate walk time in the absence of pedestrians.

Leading Pedestrian Intervals (LPI) are used to reduce right turn and permissive left turn vehicle and pedestrian conflicts. The through pedestrian interval is initiated first, in advance of the concurrent through/right/permissive left turn interval. The LPI minimizes vehicle-pedestrian conflicts because it gives pedestrians a 3-10 second head start into the intersection, thereby making them more visible, and reducing crossing exposure time.

Accessible Pedestrian Signals (APS) are designed to be accessible by individuals with visual disabilities. They provide audible tones or verbal messages to convey when it is appropriate to walk, when they must wait, and feedback when the signal has been actuated via push-button. This eliminates the need for pedestrians to rely entirely on the audible cues provided by moving cars, which may be deceiving depending on the complexity of traffic signal operations at the intersection.

Pedestrian Traffic Signal Enhancements



Leading Pedestrian Interval



Passive Infrared Pedestrian Detector



Push-buttons will require regular inspection

Materials and Maintenance

Detection and actuation equipment will require regular maintenance. As a result, fixed operations require less maintenance than actuated operations. Intersections employing split phasing, right turn overlaps, or protected-permitted left-turn signals should be monitored to ensure that conflicting pedestrian and vehicle movements do not occur.

Additional References and Guidance

FHWA. *Signal Timing Manual*. 2008.
FHWA. *Signalized Intersections: Informational Guide*. 2nd Edition. 2013.
Caltrans. *California Manual on Uniform Traffic Control Devices*. 2012.
NACTO. *Urban Street Design Guide*. 2013.

Active Warning Beacons (RRFB)

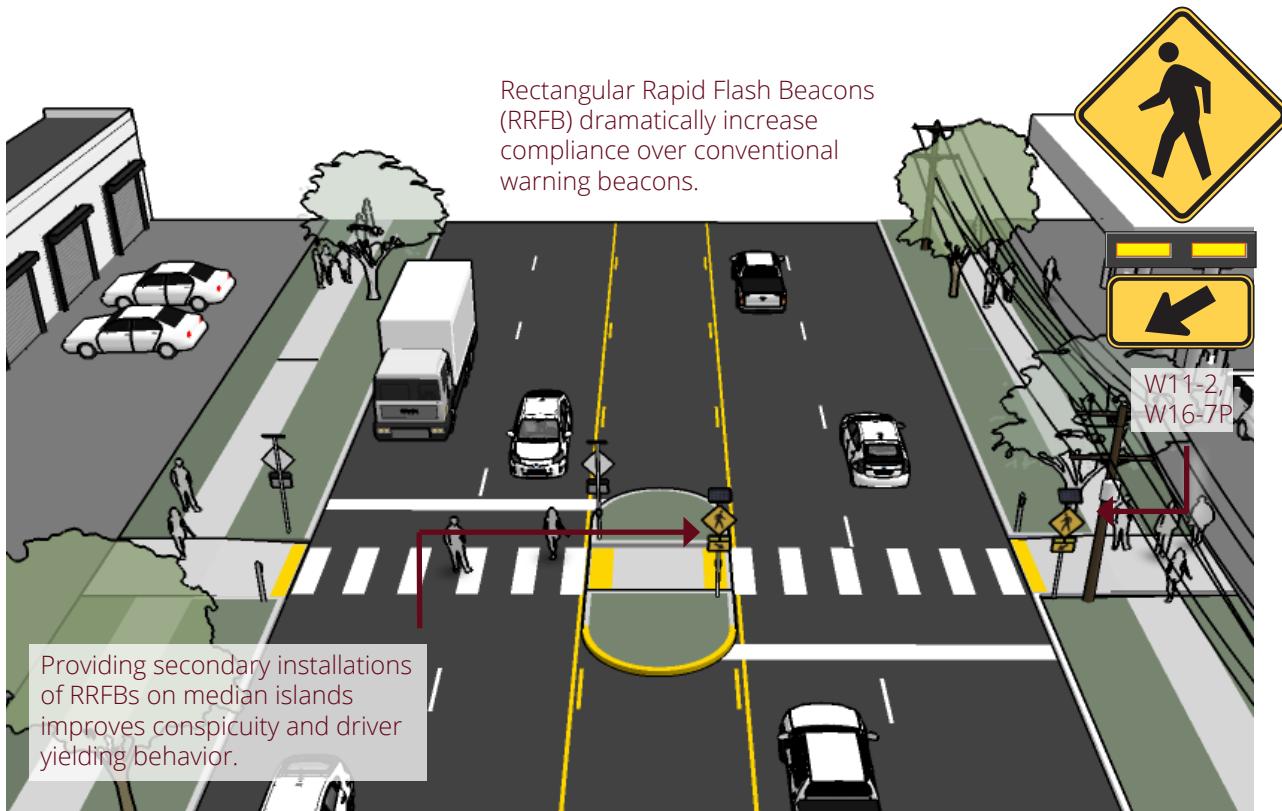
Description

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.



Discussion

Rectangular rapid flash beacons have the most increased compliance of all the warning beacon enhancement options. A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent (according to a 2009 FHWA study). Additional studies over long term installations show little to no decrease in yielding behavior over time.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11)*. 2008.

Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs should run for years without issue.

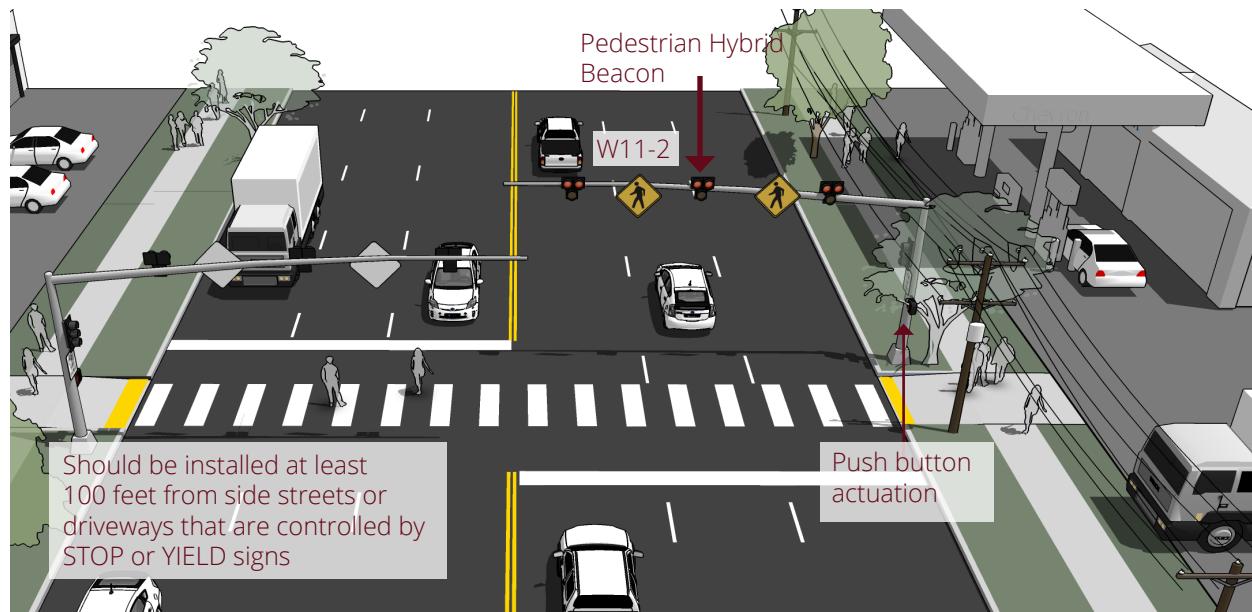
Hybrid Beacons

Description

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk

Guidance

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.



Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

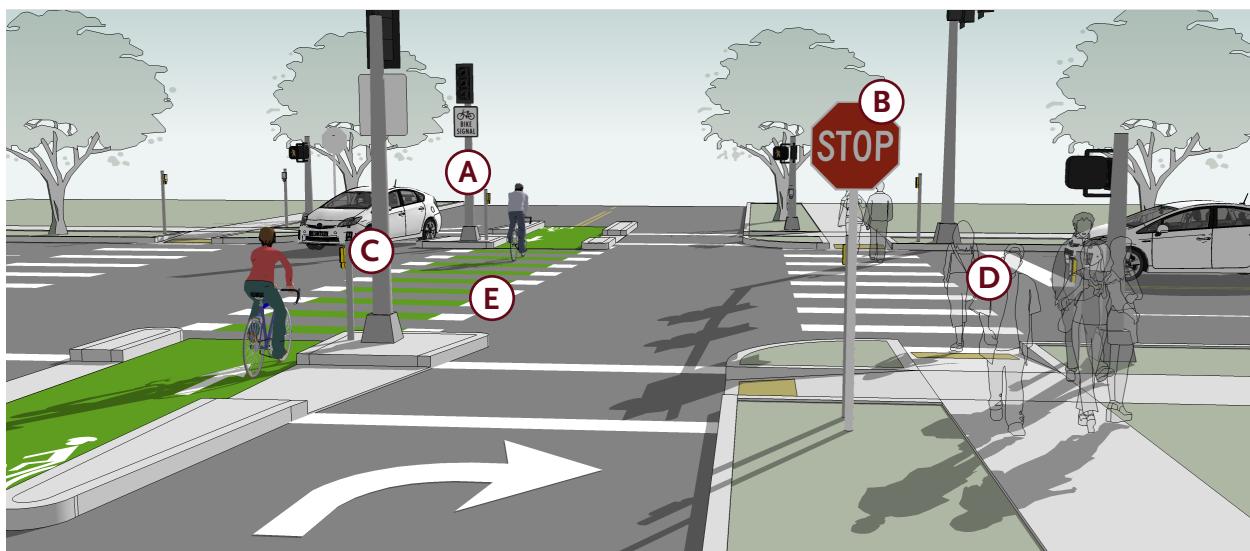
Toucan Signals

Description

“Toucan” crossings of streets are a type of signal configuration that provides minor street or mid-block signal indication for bicyclists and pedestrians, but not for motor vehicles, so that “two can” cross the major street.

Design Features

- (A)** A toucan signal assembly may be created by pairing a bicycle signal head with a pedestrian signal head.
- (B)** If located at an intersection, the major street receives standard traffic signal control, and the minor cross street has STOP sign to control motor vehicle traffic. The design may be paired with access management or other measures to reduce potential conflicts.
- (C)** The pedestrian/bike phase is typically activated by a push button or passive detection.
- (D)** Stop lines, high visibility crosswalk markings and bicycle lane dotted line extensions should be used to clarify crossing expectations.
- (E)** Green colored pavement may be used to highlight the bike lane crossing.



Additional References and Guidelines

NCHRP 562: Improving Pedestrian Safety at Unsignalized Crossings. 2006.

FHWA Interim Approval 16 (I.A. 16). (Note: Because this is an unconventional configuration at intersections, it is important to operate all Toucan signals consistently across the city for maximum safety and understanding. (NCHRP 562). FHWA has approved bicycle signals for use, if they comply with requirements from F.C. Interception Approval 16 (I.A. 16).

Typical Application

- Appropriate at mid-block or carefully designed intersection locations.
- Across higher traffic streets where pedestrians and bicyclists are crossing together.
- Across higher traffic streets where a conventional traffic signal or pedestrian hybrid beacon is considered to assist in pedestrian and bicyclist crossings.

Implementation & Costs

Cost will depend on the complexity and size of the intersection, but in general, costs are comparable to the installation of conventional traffic signals (i.e. controller boxes, detection devices, mast arms, etc.).

Toucan Signals

Toucan signal with channelized crossing island



This central island also functions as a right-out channelization island for motor vehicles. (Tucson, AZ)

Toucan signal at mid-block location



A mid-block toucan signal uses high visibility crossing markings to separate user types. (Berkeley, CA)

Further Considerations

- MUTCD guidance discourages installation of half signals at intersection locations. However, based on an engineering study or engineering judgment, a jurisdiction can decide to install the device at such an intersection if it determines that is the best location for it, considering all pertinent factors, and/or there are mitigating measures.
- Pedestrians typically need more time to travel through an intersection than bicyclists. Signal timing and recall phases may be configured to be responsive to the detection and actuation by different user types with different signal and clearance intervals.
- Bicycle detection and actuation systems include loop detectors, video detection, microwave, radar, or other technologies that trigger the activation of the bicycle signal when a bicycle is detected.
- Toucan signals operate in a similar fashion to Pedestrian Hybrid Beacons (PHB). PHBs have shown a crash reduction of 29% for all crash types (CMF ID: 2911) and 15% for fatal or serious injury crashes (CMF ID: 2917).

Full Traffic Signal

Description

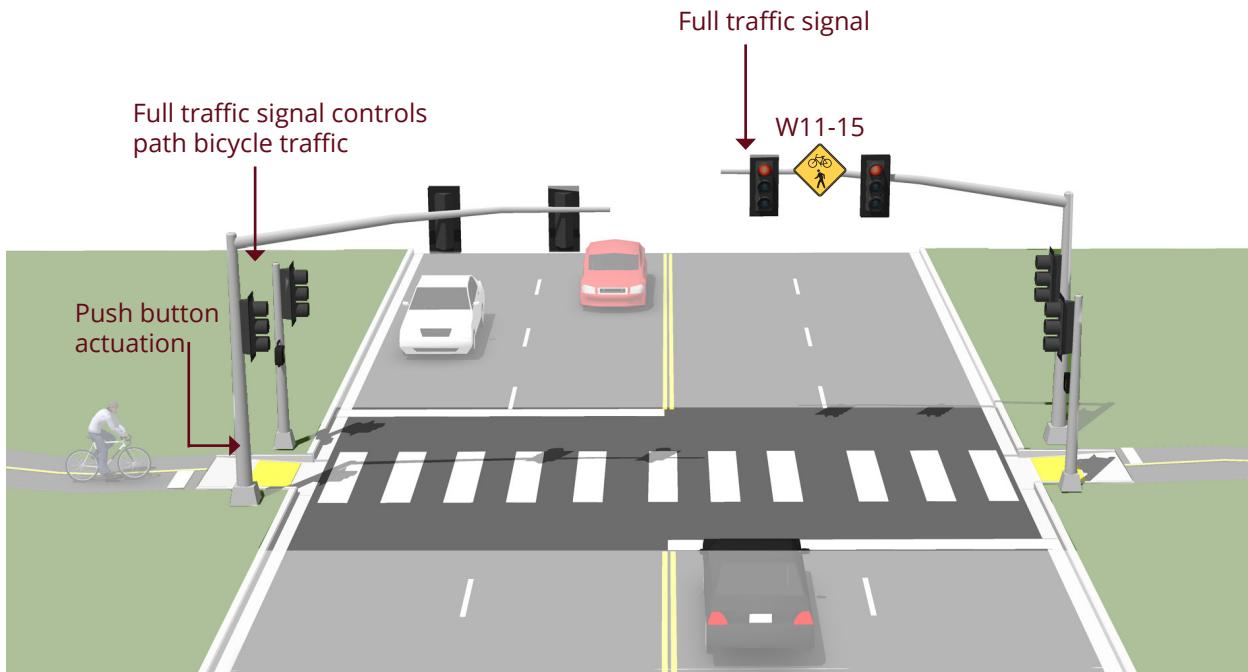
Signalized crossings provide the most protection for crossing path users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

A full traffic signal installation treats the path crossing as a conventional 4-way intersection and provides standard red-yellow-green traffic signal heads for all legs of the intersection.

Guidance

Full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Additional guidance for signalized crossings:

- Located more than 300 feet from an existing signalized intersection
- Roadway travel speeds of 40 MPH and above
- Roadway ADT exceeds 15,000 vehicles



Discussion

Shared-use path signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

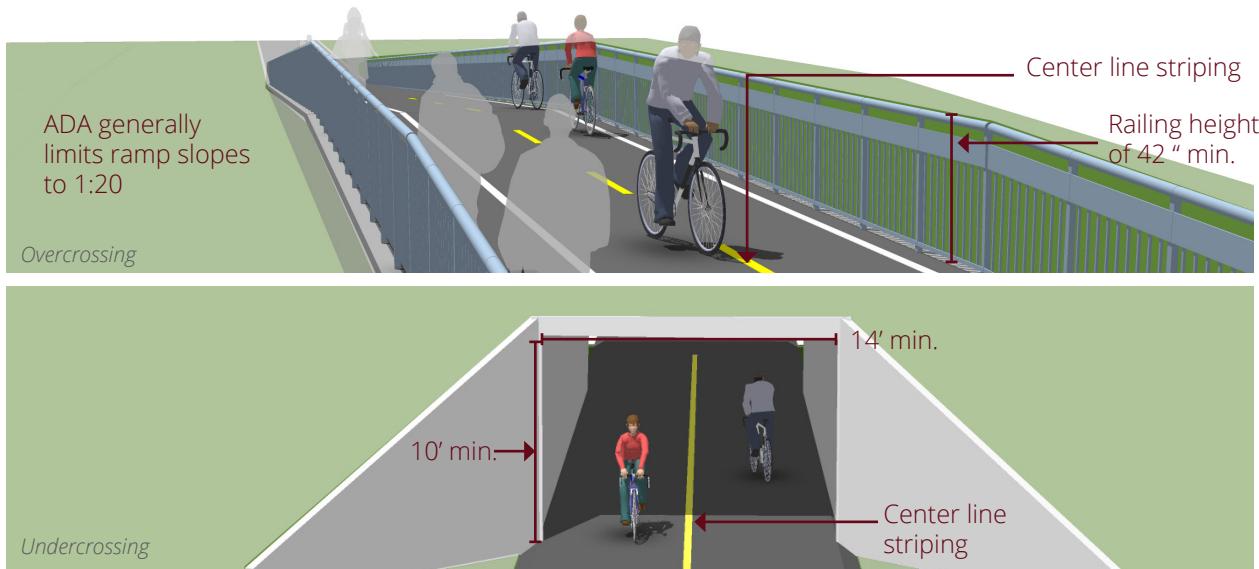
Materials and Maintenance

Traffic signals require routine maintenance. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Grade-Separated Crossings

Description

Grade separated crossings provide critical non-motorized system links by joining areas separated by barriers such as railroads, waterways and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group, grade separation may be considered in many types of projects.



Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet. Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope. Safety is a major concern with undercrossings. Shared-use path users may be temporarily out of sight from public view and may experience poor visibility themselves. To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency cell phones at each end and completely visible for its entire length from end to end.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.

Guidance

Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below versus a minimum elevation differential of around 12 feet for an undercrossing. This can result in greater elevation differences and much longer ramps for bicycles and pedestrians to negotiate. Overcrossings should be at least 8 feet wide with 14 feet preferred and additional width provided at scenic viewpoints. Undercrossings should be designed at minimum 10 feet height and 14 feet width.

Materials and Maintenance

14 foot width allows for maintenance vehicle access. Potential problems include conflicts with utilities, drainage, flood control and vandalism. Overcrossings can be more difficult to clear of snow than undercrossings.

Appendix A

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Denver Rio Grande Western Rail Trail near Shepard Lane

3: Shared-use Paths

Introduction

A shared-use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of shared-use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

Path Crossings

In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path

facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture (see Chapter 2 of this appendix). Signing for path users may include a standard "STOP" or "YIELD" sign and pavement markings, possibly combined with other features such as bollards or a bend in the pathway to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. Crosswalk striping is typically a matter of local and state preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.

General Design Practices

Description

Shared-use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

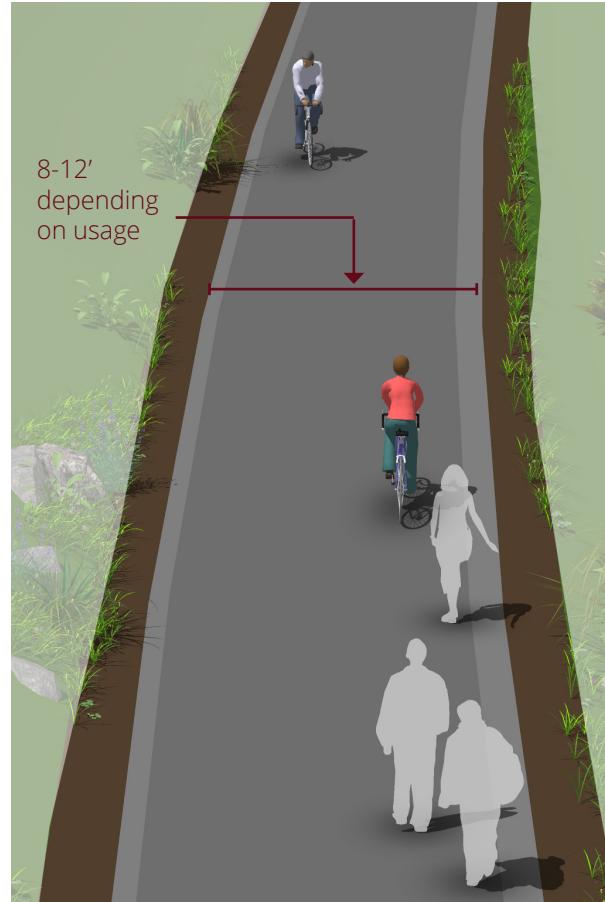
- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is provided, use a 4 inch dashed yellow center line stripe with 4 inch solid white edge lines.
- Solid center lines can be provided on tight or blind corners, and on the approaches to roadway crossings.



Discussion

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development*. 1993.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Shared-Use Paths Along Roadways

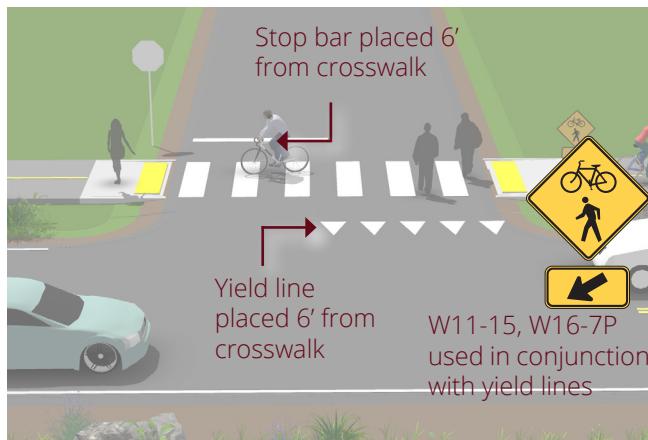
Description

Shared-use paths along roadways, also called Sidepaths, are a type of path that run adjacent to a street. Because of operational concerns it is generally preferable to place paths within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path. The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings.

In general, there are two approaches to crossings: adjacent and setback crossings, illustrated below.

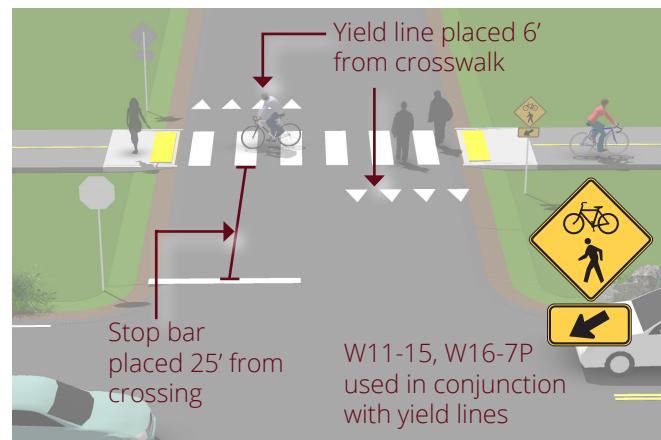
Adjacent Crossing - A separation of 6 feet emphasizes the conspicuity of riders at the approach to the crossing.



Guidance

- Guidance for sidepaths should follow that for general design practices of shared-use paths.
- A high number of driveway crossings and intersections create potential conflicts with turning traffic. Consider alternatives to sidepaths on streets with a high frequency of intersections or heavily used driveways.
- Where a sidepath terminates special consideration should be given to transitions so as not to encourage unsafe wrong-way riding by bicyclists.
- Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Crossings may be STOP or YIELD controlled depending on sight lines and bicycle motor vehicle volumes and speeds.

Setback Crossing - A set back of 25 feet separates the path crossing from merging/turning movements that may be competing for a driver's attention.



Discussion

The provision of a shared-use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities. To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
NACTO. *Urban Bikeway Design Guide*. See entry on Raised Cycle Tracks. 2012.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the user experience.

Local Neighborhood Accessways

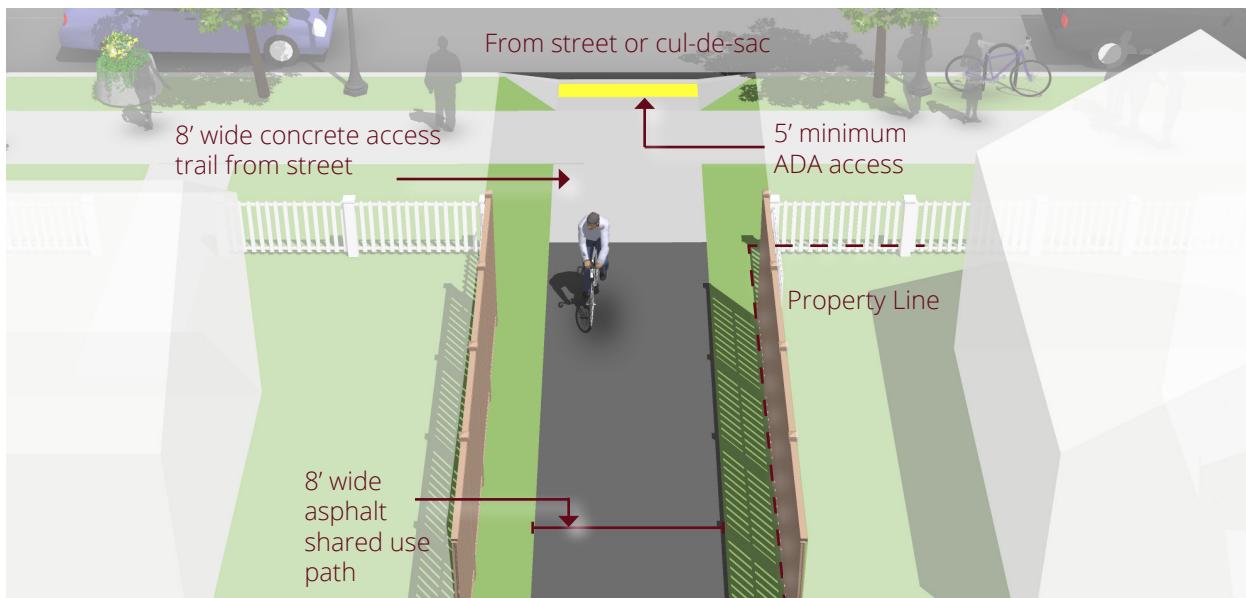
Description

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, shared use paths, green spaces, and other recreational areas. They most often serve as small shared use path connections to and from the larger shared use path network, typically having their own rights-of-way and easements.

Additionally, these smaller shared use paths can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.

Guidance

- Neighborhood accessways should remain open to the public.
- Shared use path pavement shall be at least 8' wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Shared use path widths should be designed to be less than 8' wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible.



Discussion

Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations. For existing subdivisions, Neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
FHWA. *Federal Highway Administration University Course on Bicycle and Pedestrian Transportation. Lesson 19: Greenways and Shared Use Paths*. 2006.
NACTO. *Urban Bikeway Design Guide*. 2012.

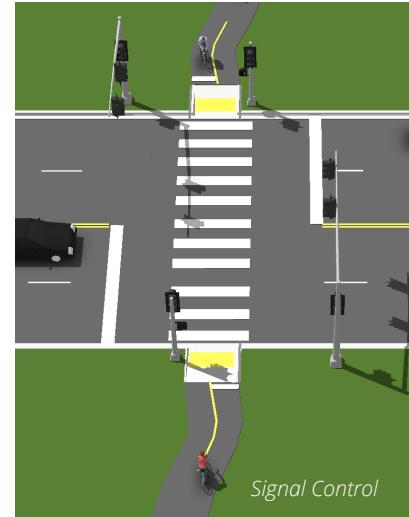
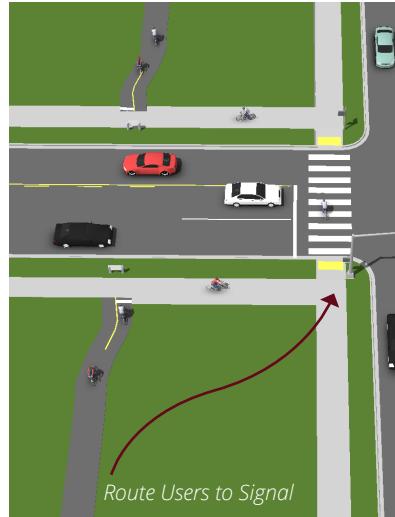
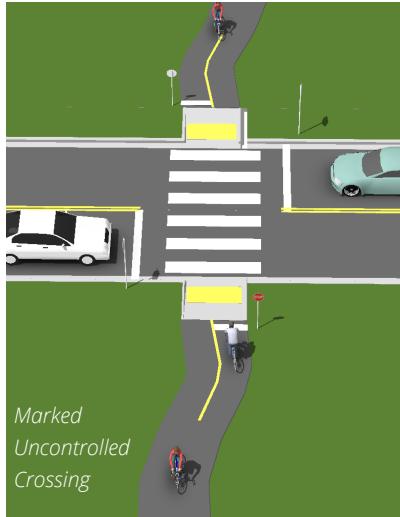
Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Shared-use Path Crossings

Description

At-grade roadway crossings can create potential conflicts between path users and motorists, however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users.



Guidance

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

Discussion

Marked Crossings are appropriate on a two lane road with $\leq 9,000$ - $12,000$ Average Daily Traffic (ADT) volume, and speeds below 35 mph. Crossings of streets with higher speeds, higher volumes, and additional lanes require additional enhancements such as median islands or active warning beacons.

Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, **route the path directly to the signal**. Barriers and signing may be needed to direct shared-use path users to the signalized crossings.

At **signal-controlled crossings**, full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Signalized crossings should be located more than 300 feet from an existing signalized intersection, and include push button actuation for shared-use path users. The maximum delay for activation of the signal should be two minutes.

Additional References and Guidelines

- AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
- AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
- FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
- FHWA. *Pedestrian Hybrid Beacon Guide - Recommendations and Case Study*. 2014.
- FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11)*. 2008.
- NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs. Signing and striping need to be maintained to help users understand any unfamiliar traffic control. If a sidewalk is used for crossing access, it should be kept clear of snow and debris and the surface should be level for wheeled users. Traffic signals and hybrid beacons require routine maintenance.

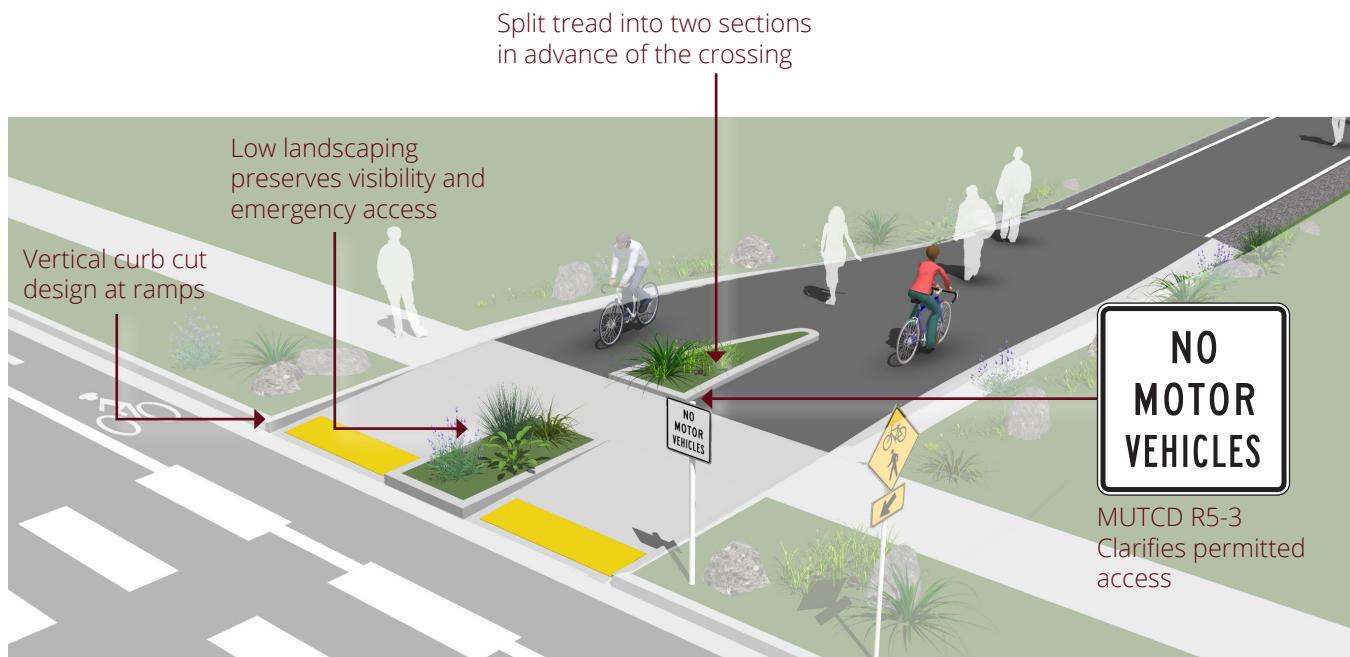
Bollard and Gate Alternatives at Shared-use Path Crossings

Description

Bollards are physical barriers designed to restrict motor vehicle access to the multi-use path. Unfortunately, significantly-vertical physical barriers create obstacles to legitimate trail users and are often ineffective at preventing access. Alternative design strategies use signage, landscaping, and curb cut design to reduce the likelihood of motor vehicle access and slow trail users before crossings.

Guidance

- Bollards or other barriers should not continue to be used unless there is a documented history of unauthorized intrusion by motor vehicles.
- “No Motor Vehicles” signage (MUTCD R5-3) may be used to reinforce access rules.
- At intersections, split the path tread into two sections separated by low landscaping.
- Vertical curb cuts should be used to discourage motor vehicle access.
- Consider targeted surveillance and enforcement at specific intrusion locations



Discussion

Bollards or other barriers should not be used unless there is a documented history of unauthorized intrusion by motor vehicles. If unauthorized use persists, assess whether the problems posed by unauthorized access exceed the risks and issues posed by bollards and other barriers.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.

Materials and Maintenance

Landscaping separation between treads should be maintained to a height easily straddled by emergency vehicles.



Conventional bicycle lane on State Street in Farmington

4: Bicycle Facilities

On-Street Bikeways

Designated exclusively for bicycle travel, on-street bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. On-street bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

On-street bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.

Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

Bicycle boulevards are a special class of shared roadways designed for a broad spectrum of bicyclists. They are low-volume local streets where motorists and bicyclists share the same travel lane. Treatments for bicycle boulevards are selected as necessary to create appropriate automobile volumes and speeds, and to provide safe crossing opportunities of busy streets. See the Bicycle Boulevards section on Page A-40 for more information.

Bicycle Boulevards

Description

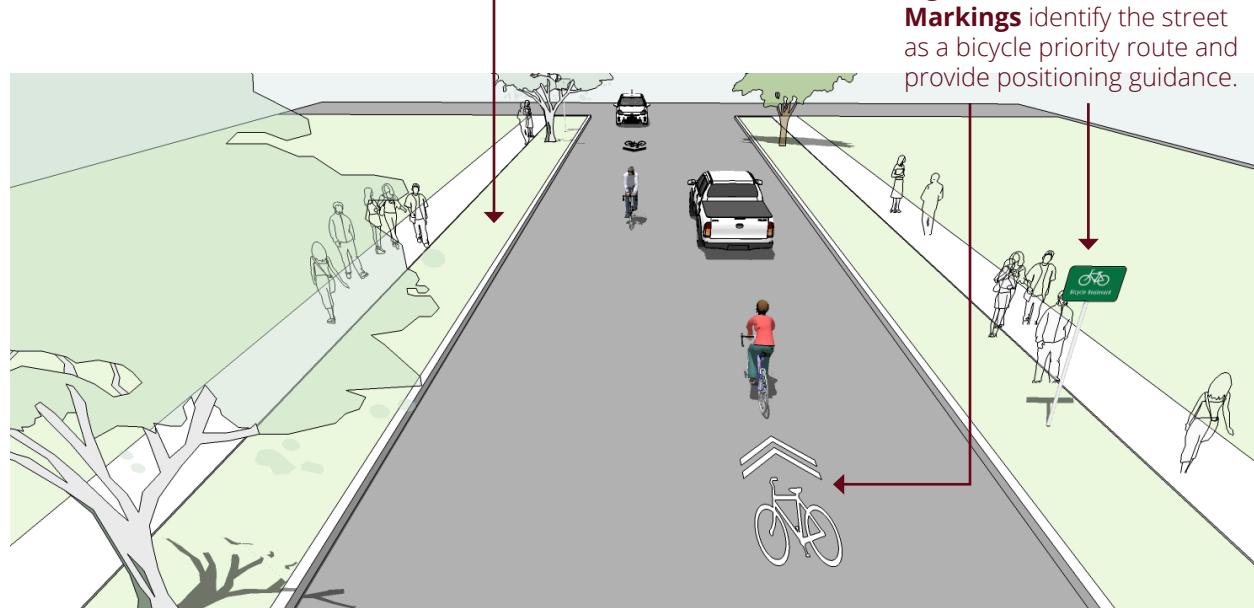
Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.



Wayfinding signage provides directions, distance and estimated travel time to nearby destinations.

Guidance

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.



Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety. Traffic calming can deter motorists from driving on a street. Anticipate and monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
BikeSafe. *Bicycle countermeasure selection system*.
Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.

Materials and Maintenance

Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Bike Lanes

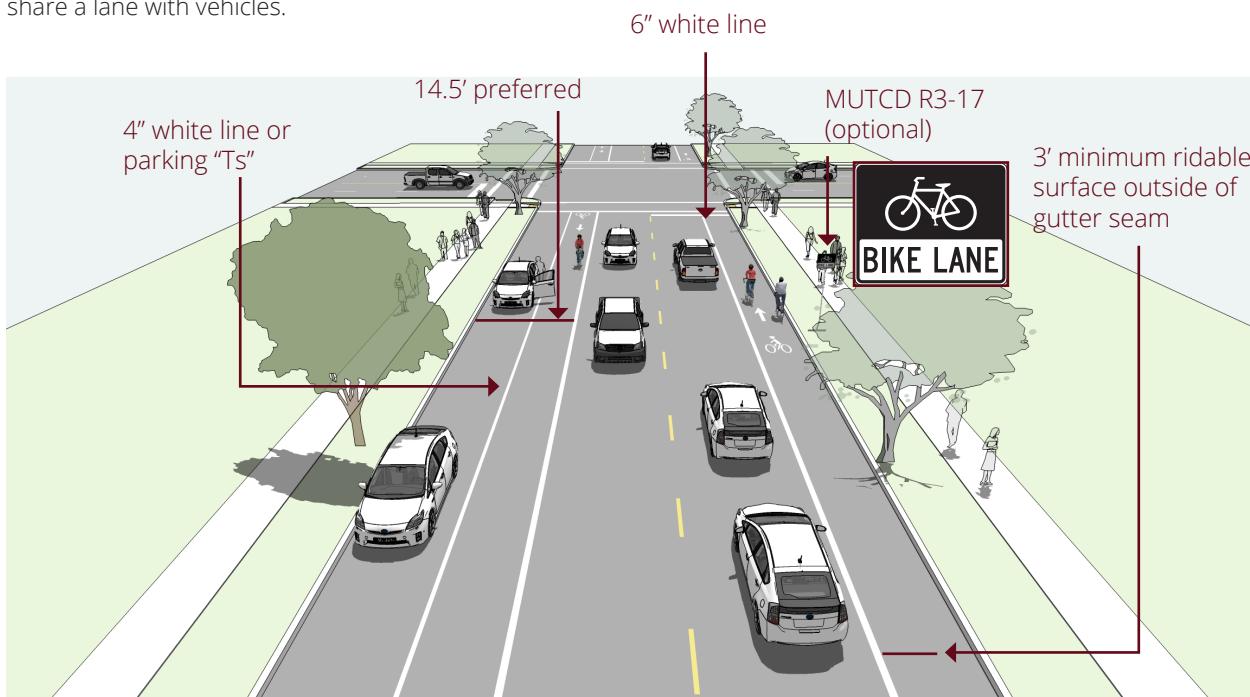
Description

Conventional bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum) when adjacent to parallel parking.
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider buffered bike lanes when further separation is desired.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

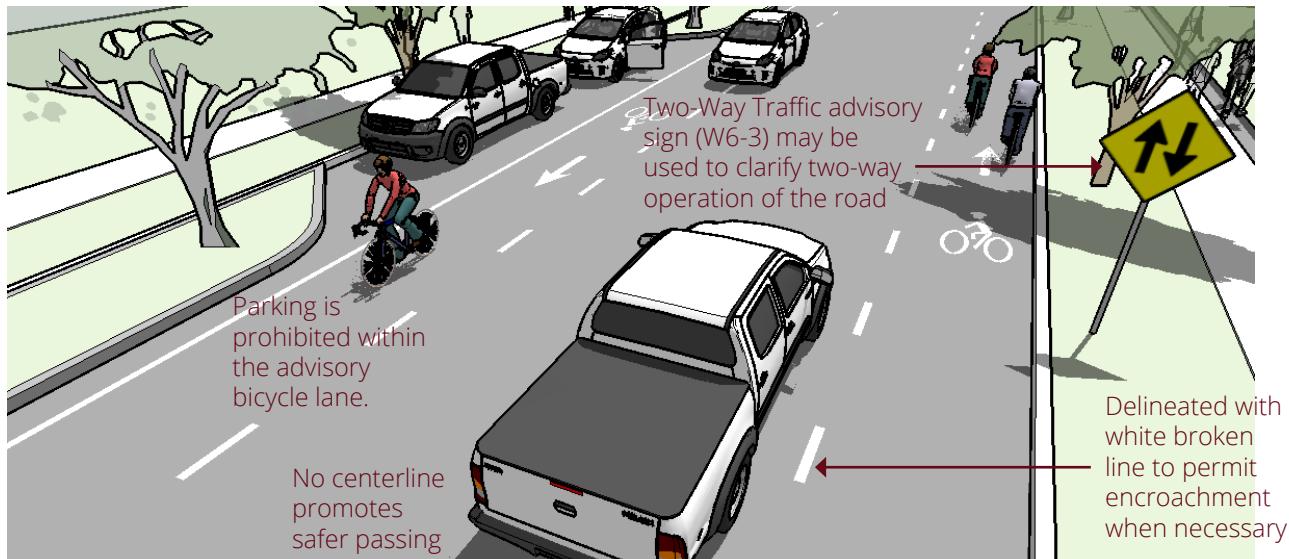
Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Advisory Bike Lanes

Description

Advisory bicycle lanes (also called dashed bicycle lanes) provide a bicycle-priority space 5-7 feet wide with bicycle lane markings on a roadway too narrow for conventional bicycle lanes. Similar in appearance to bicycle lanes, advisory bicycle lanes are distinct in that they are temporarily shared with motor vehicles during head-on approaching maneuvers and turning movements.

Benefits of advisory bicycle lanes include creating priority for people bicycling in what would otherwise be a shared-roadway condition, increasing predictability and clarifying positioning between people bicycling and people driving, and encouraging increased separation while passing.



Discussion

This treatment is considered experimental by FHWA and may require a Request to Experiment as described in Section 1A.10 of the MUTCD. Specific design detail should conform to MUTCD and any experimentation requirements. Advisory bicycle lanes may be appropriate on low volume streets in freight districts. Required passing widths for truck or emergency vehicles should be considered on routes where such vehicles are anticipated.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities and A Policy on Geometric Design of Highways and Streets*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Guidance

- This treatment is most appropriate on narrow (20-30 feet), two-lane roadways where there is insufficient space for conventional bicycle lanes and that have low volumes. Streets with travel area wider than 30 feet can support conventional bike lanes.
- Motor vehicle traffic volumes are low-moderate (1,500-4,500 ADT), but may function on streets with as high as 6,000 ADT.
- The roadway is preferably straight with few bends, inclines or sightline obstructions.
- Should not be implemented in areas where parking demand is high enough that parked cars would obstruct the advisory bicycle lanes.
- Recommended two-way motor vehicle travel lane width of 16 ft, though some are as narrow as 10 ft.

Materials and Maintenance

Consider the use of colored pavement within the advisory bicycle lane area to discourage unnecessary encroachment by motorists or parked vehicles.

Buffered Bike Lanes

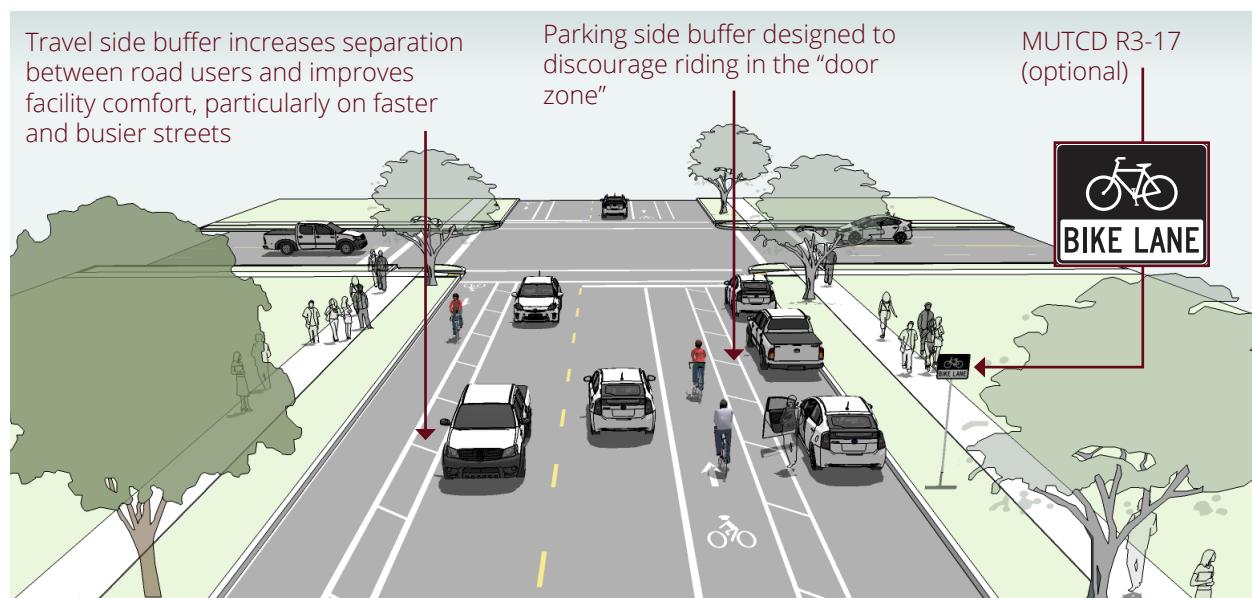
Description

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes follow general guidance for buffered preferential vehicle lanes as per MUTCD guidelines (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

Guidance

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dashed line for the inside buffer boundary where cars are expected to cross.
- Buffered bike lanes can buffer the travel lane only, or parking lane only depending on available space and the objectives of the design.



Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
 FHWA. *Manual on Uniform Traffic Control Devices*. (3D-01). 2009.
 NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

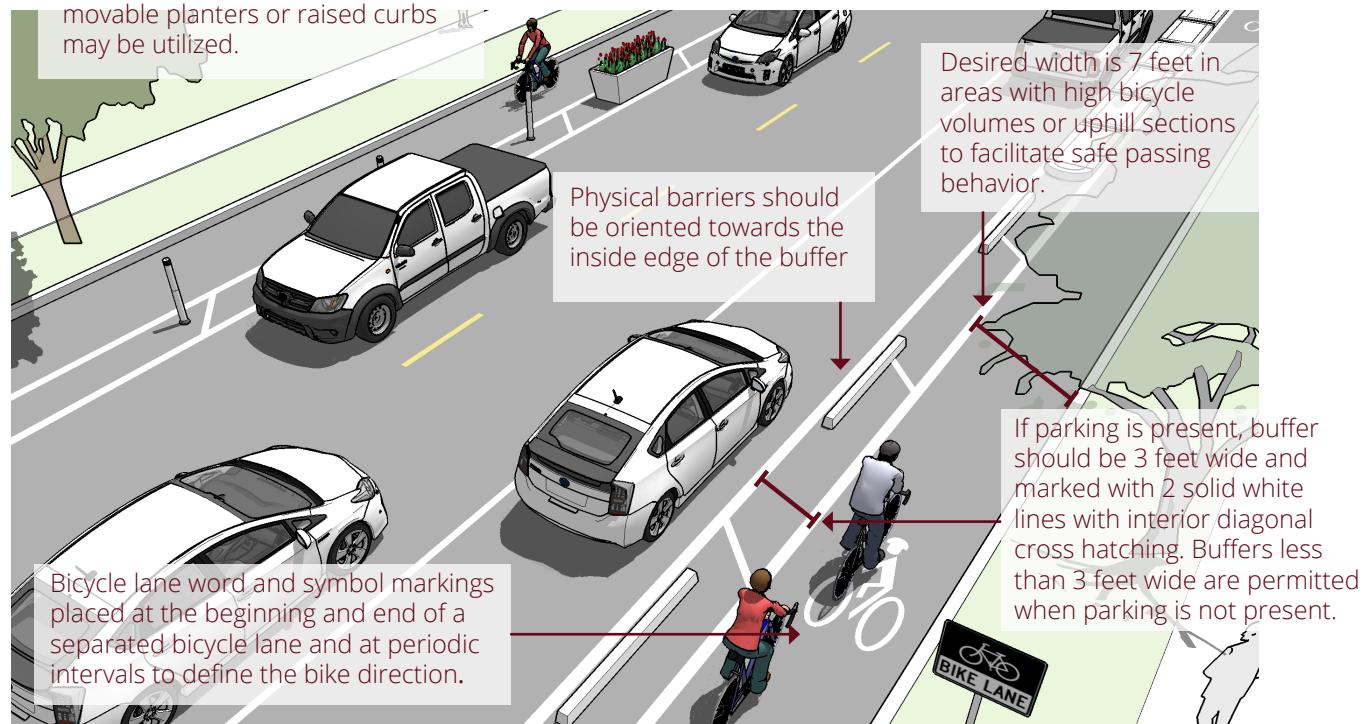
Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

One-Way Separated (or Protected) Bike Lanes

Description

One-way separated bike lanes, also known as cycle tracks or protected bike lanes, are physically protected from motor traffic and distinct from the sidewalk. Separated bike lanes are either raised or at street level and use a variety of elements for physical protection from passing traffic.

Vertical separation treatments such as parking, tubular markings, movable planters or raised curbs may be utilized.



Guidance

- 7 foot recommended minimum to allow passing.
- 5 foot minimum width in constrained locations.
- When placed adjacent to parking, the parking buffer should be three feet wide to allow for passenger loading and to prevent door collisions.
- When placed adjacent to a travel lane, one-way raised bikeways may be configured with a mountable curb to allow entry and exit from the bicycle lane for passing other bicyclists or to access vehicular turn lanes.

Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to separated bike lane design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the bikeway has priority over entering and exiting traffic. If configured as a raised separated bike lane, the crossing should be raised so that the sidewalk and separated bike lane maintain their elevation through the crossing.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

In cities with winter climates, barrier separated and raised bike lanes may require special equipment for snow removal.

Two-Way Separated (or Protected) Bike Lanes

Description

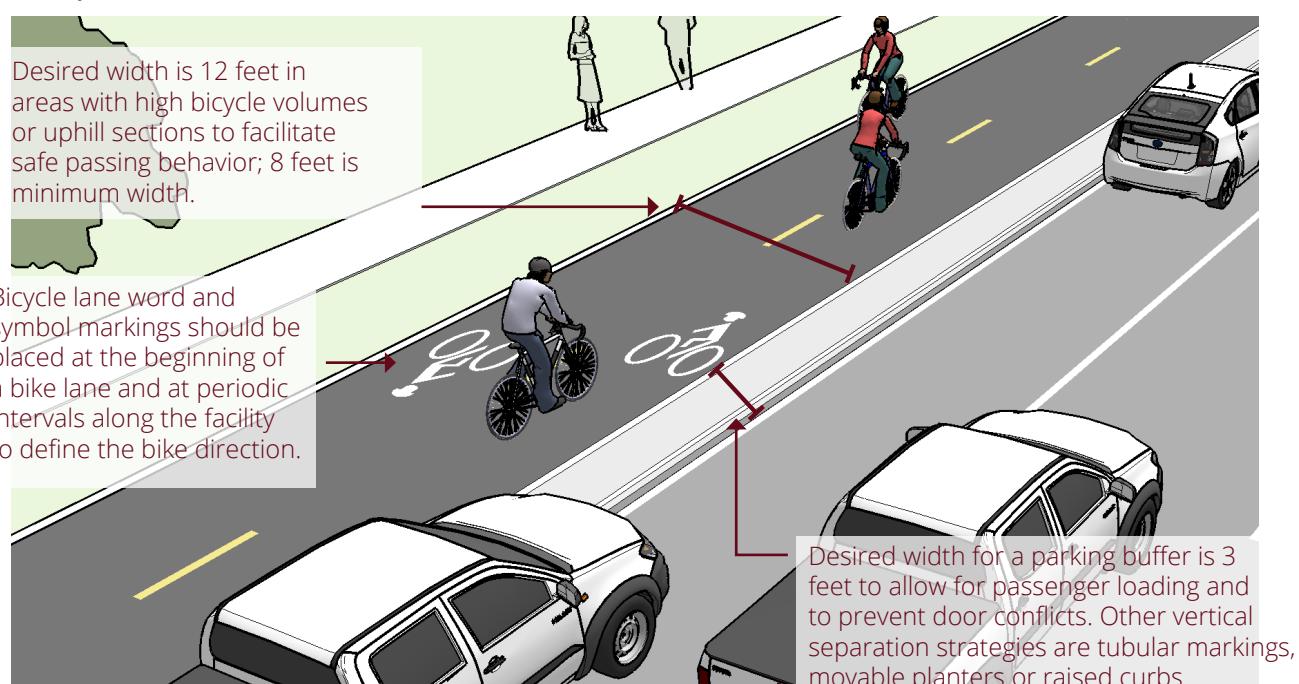
Two-way separated bike lanes, also known as cycle tracks or protected bike lanes, are physically protected facilities that allow bicycle movement in both directions on one side of the road. Two-way bike lanes share some of the same design characteristics as one-way facilities, but may require additional considerations at driveway and side-street crossings.

A two-way separated bike lane may be configured as a protected facility at street level with a parking lane or other barrier between the bikeway and the motor vehicle travel lane and/or as a raised bike lane to provide vertical separation from the adjacent motor vehicle lane.

Guidance

- 12 foot recommended minimum for two-way facility
- 8 foot minimum in constrained locations
- When placed adjacent to parking, the parking buffer should be three feet wide to allow for passenger loading and to prevent door collisions.

Two-way separated bike lanes work best on one-way streets. Single direction motor vehicle travel minimizes potential conflict with bicyclists.



Discussion

Two-way separated bike lanes require a higher level of control at intersections to allow for a variety of turning movements. These movements should be guided by separated signals for bicycles and motor vehicles. Transitions into and out of two-way bike lanes should be simple and easy to use to deter bicyclists from continuing to ride against the flow of traffic. At driveways and minor intersections, bicyclists riding against roadway traffic in two-way bike lanes may surprise pedestrians and drivers not expecting bidirectional travel. Appropriate signage is recommended.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

In cities with winter climates barrier, separated and raised separated bike lanes may require special equipment for snow removal.

Separated Bike Lane Protection Methods

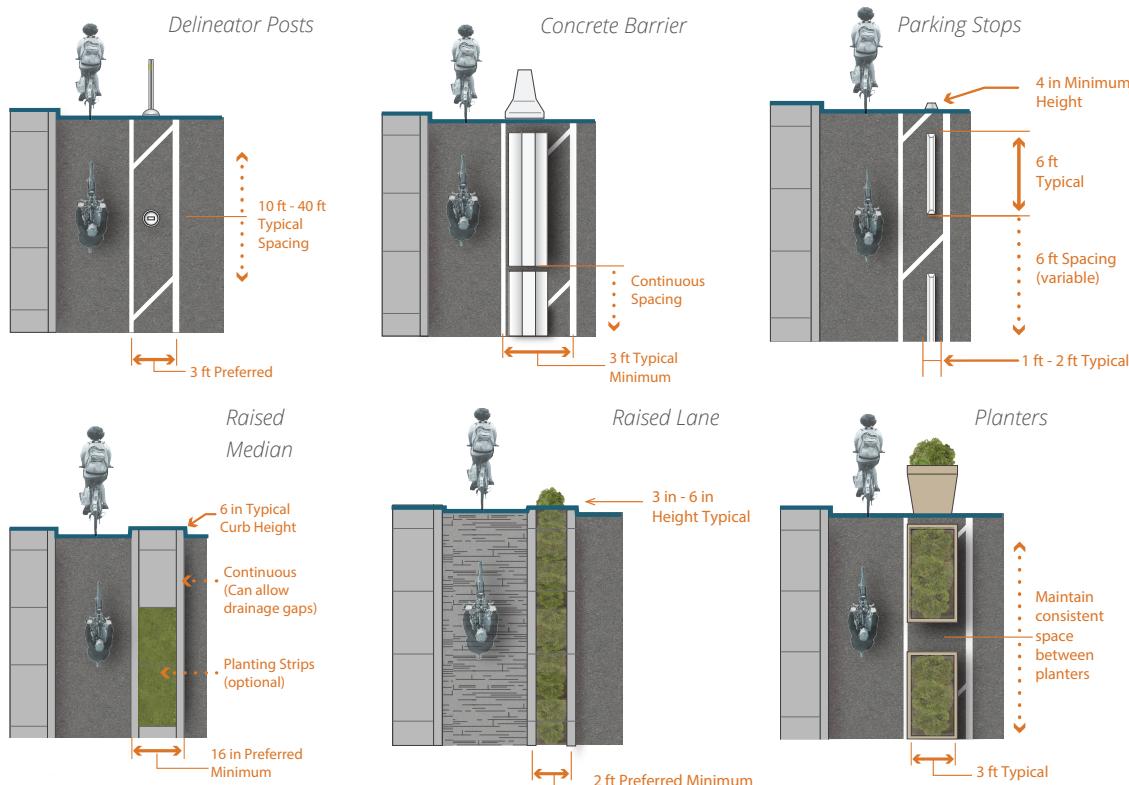
Description

Protection is provided through physical barriers and can include bollards, parking, a planter strip, an extruded curb, or on-street parking. Separated bike lanes using these protection elements typically share the same elevation as adjacent travel lanes.

Raised separated bike lanes may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to distinguish the separated bike lane from the pedestrian area.

Guidance

- Separated bike lanes should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles. Separated bike lanes located on one-way streets have fewer potential conflict areas than those on two-way streets.
- In situations where on-street parking is allowed, separated bike lanes shall be located between the parking lane and the sidewalk (in contrast to bike lanes).



Source: FHWA Separated Bike Lane Planning and Design Guide. 2015.

Discussion

Sidewalks or other pedestrian facilities should not be narrowed to accommodate the separated bike lane as pedestrians will likely walk on the separated bike lane if sidewalk capacity is reduced. Visual and physical cues (e.g., pavement markings & signage) should be used to make it clear where bicyclists and pedestrians should be travelling. If possible, distinguish the separated bike lane and pedestrian zone with a furnishing zone.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

In cities with winter climates, barrier protected and raised separated bike lanes may require special equipment for snow removal.



Bicycles May Use Full Lane sign on Shepard Lane

5: Bicycle Signs and Markings

Introduction

Signage helps to regulate traffic, indicate to bicyclists and other users that a particular roadway is suitable or preferred (or not) for travel by bicycle, and may also indicate nearby destinations accessible by bicycle.

The ability to navigate through a city is informed by landmarks, natural features and other visual cues. Signs throughout the city should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misconceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and travel time to each destination

Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.

Wayfinding Sign Types

Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.

Can include destinations and distance/time. Do not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.

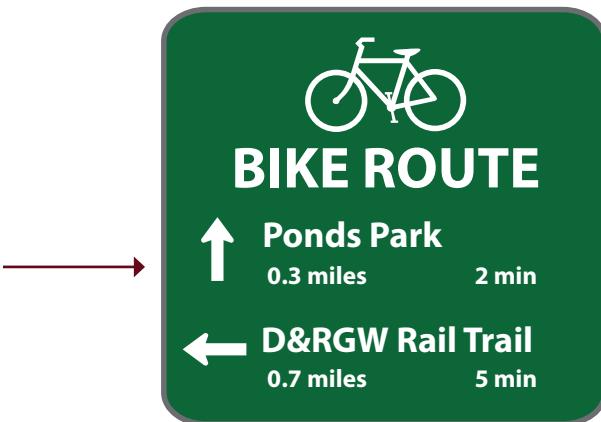
Include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways.

Inform bicyclists of the designated bike route to access key destinations. Includes destinations and arrows and distances.

Travel times are optional but recommended.



Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Wayfinding Sign Placement

Guidance

Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

Along a route to indicate a nearby destination.

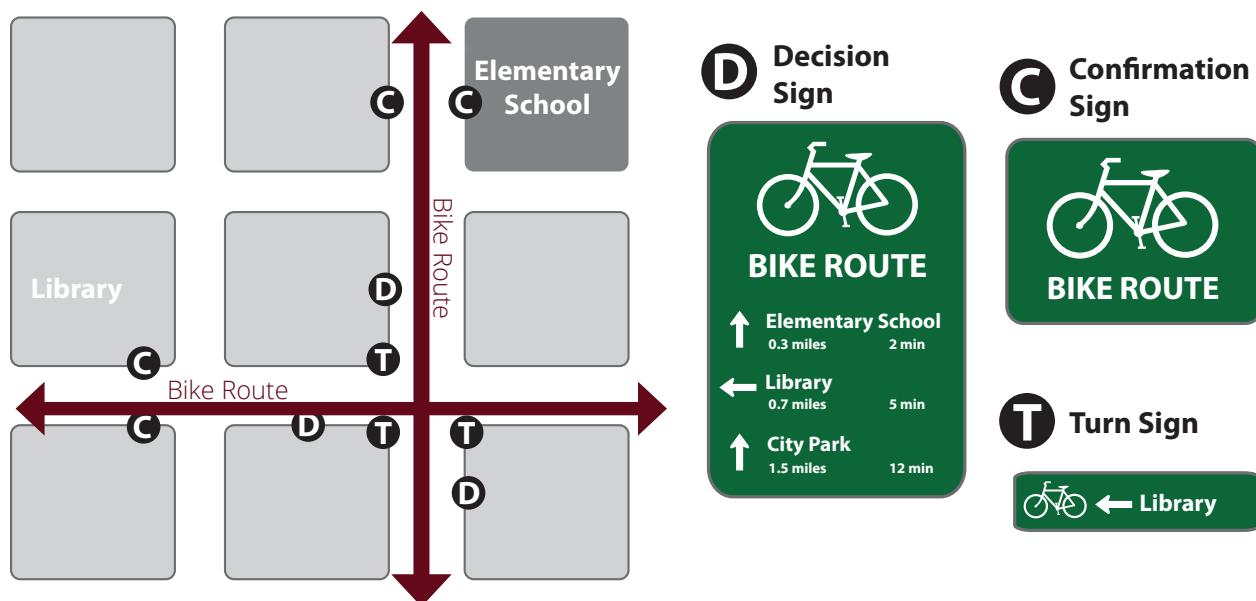
Description

Confirmation Signs

Every $\frac{1}{4}$ to $\frac{1}{2}$ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs

Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.



Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
 FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
 NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Regulatory and Warning Signs

Description

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement and parking. They are usually rectangular or square with a white background and black, white or colored letters. Regulatory signs with a red background are reserved for STOP, YIELD, DO NOT ENTER or WRONG WAY messages. Red text indicates a restricted parking conditions, and a circle with a line through it means the activity shown is not allowed.

Warning signs call attention to unexpected conditions on or adjacent to a street, and to situations that might not be readily apparent to road users. Warning signs alert users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. They are usually diamond-shaped or square with a retroreflective yellow or fluorescent yellow-green background with black letters.

Common Bicycle Oriented Regulatory Signs



Guidance

- Small-sized signs or plaques may be used for bicycle-only traffic applications, such as along shared-use paths.
- See the MUTCD 9B for a detailed list of regulatory sign application and guidance.
- Fieldwork and engineering judgment are necessary to fine-tune the placement of signs.
- The SHARE THE ROAD plaque (W16-P) shall not be used alone, and must be mounted below a W11-1 vehicular traffic warning sign. It is typically placed along roadways with high levels of bicycle usage but relatively hazardous conditions for bicyclists. The sign should not be used to designate a preferred bicycle route, but may be used along short sections of designated routes where traffic volumes are higher than desirable.

Additional Bicycle-Oriented Warning Signs



Bicycle Crossing Assembly

Additional warning are available to call attention to unexpected conditions for people riding bicycles, such as steep grades, rail crossings, and slippery conditions. A Bicycle Crossing Assembly using W11-1 and W16-7P arrow plaque may be used at the location of a bikeway crossing to warn other road users.



Share the Road Sign

The sign serves to make motorists aware that bicyclists might be on the road, and that they have a legal right to use the roadway.



Discussion

Signs for the exclusive use of bicyclists should be located so that other road users are not confused by them. Installation of "Share the Road" signs is an ongoing process. Each new route system that is developed is assessed for "Share the Road" signing needs. Periodic field inspections of existing routes should identify areas where changing traffic conditions may warrant additional "Share the Road" signs. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area should be avoided.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.

Materials and Maintenance

Maintenance needs for regulatory and warning signs are similar to other signs and will need periodic replacement due to wear.



A through bike lane next to a right turn lane on a UDOT road in Salt Lake County

6: Bicyclists at Intersections and Crossings

Introduction

Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

Intersection Crossing Markings

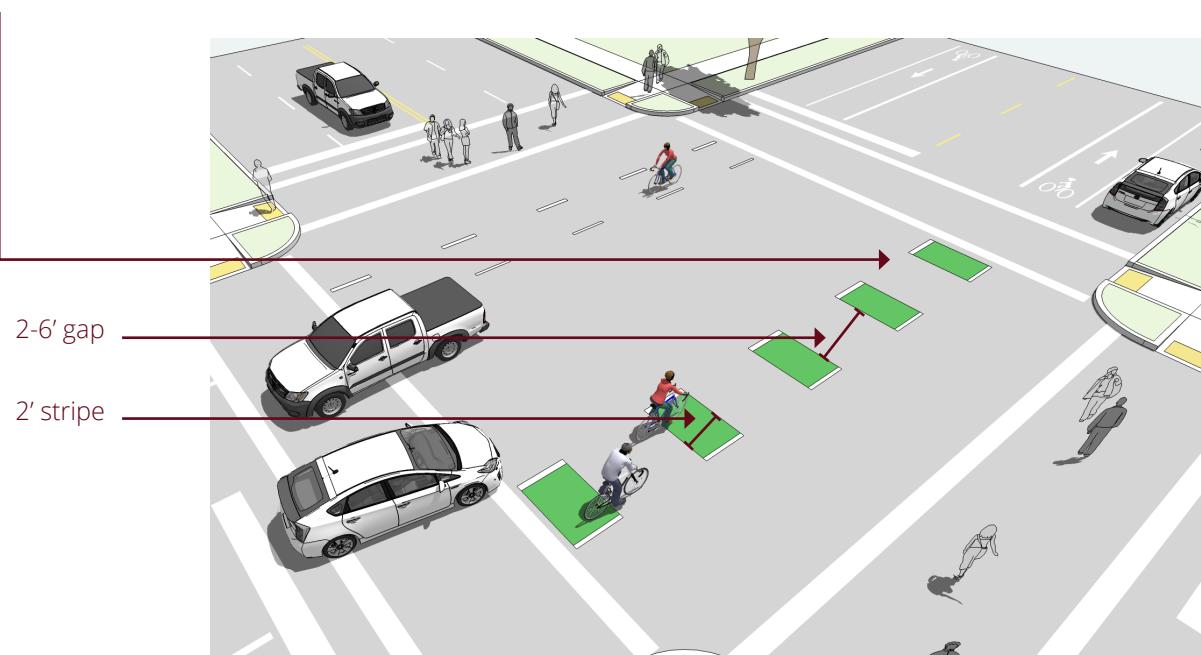
Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Skip stripe markings alert bicyclists and motorists that they are entering a conflict zone and should proceed with caution.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dashed lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, colored bike lanes, or skip striping in conflict areas may be used to increase visibility within conflict areas or across entire intersections. Elephant's Feet markings are common in Europe and Canada.



Discussion

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. (3A.06). 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

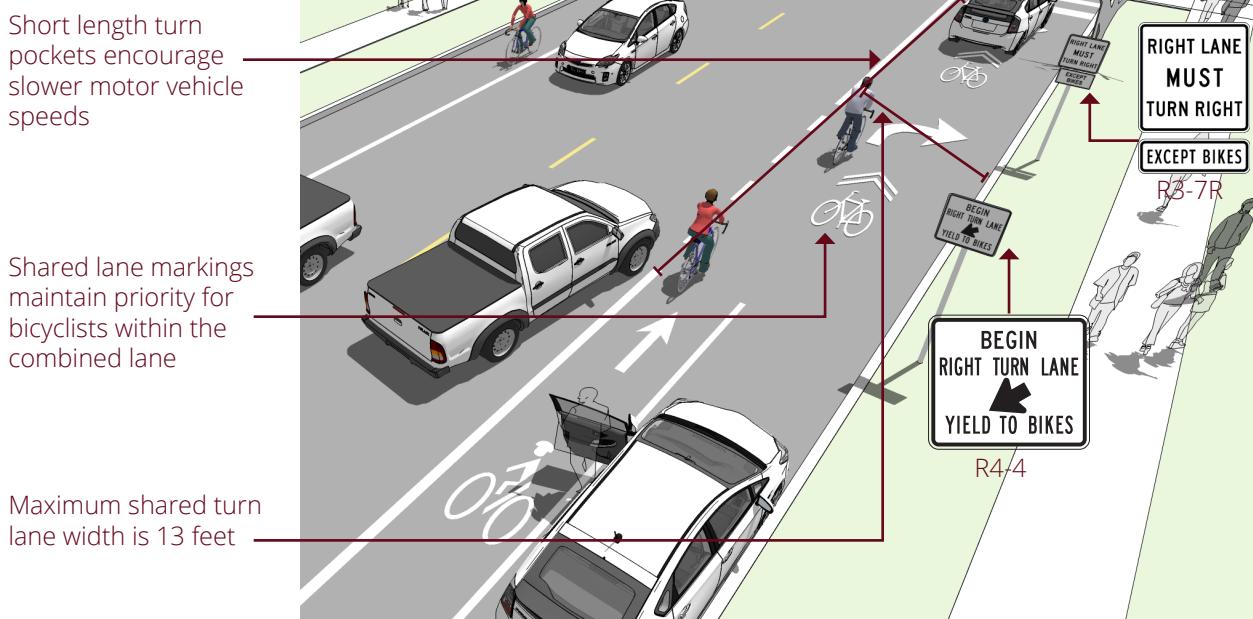
Combined Bike Lane / Turn Lane

Description

The combined bike lane/turn lane places shared lane markings within a right turn only lane. A dashed line delineates the space for bicyclists and motorists within the shared lane. Where there isn't room for a conventional bicycle lane and turn lane, a combined bike/turn lane creates a combined lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. This treatment includes markings advising bicyclists of proper positioning within the lane and is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.

Guidance

- Maximum shared turn lane width is 13 feet; narrower widths promote single file operation.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R “Right Turn Only” sign with an “Except Bicycles” plaque may be needed to make it legal for through bicyclists to use a right turn lane.



Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less). May not be appropriate for high-speed arterials or intersections with long right turn lanes. May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Locate markings out of tire tread to minimize wear. Because the effectiveness of markings depends on their visibility, maintaining markings should be a high priority.

Bike Lanes at Right Turn Only Lanes

Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane/turn lane.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.

Colored pavement may be used in the weaving area to increase visibility and awareness of potential conflict

Optional dashed lines

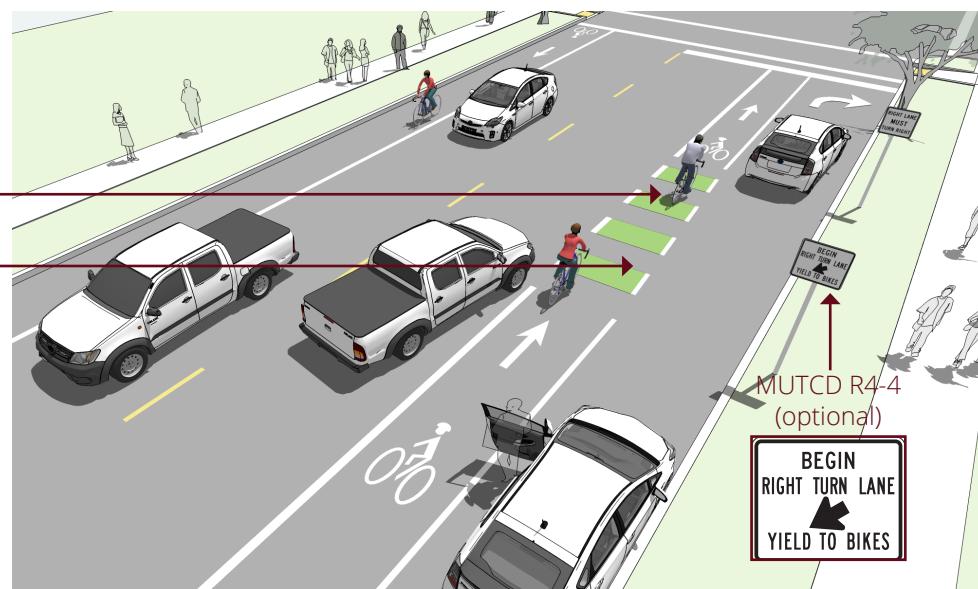
Guidance

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dashed line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.
- For additional information, see NACTO's *Urban Bikeway Design Guide* under "Intersection Treatments"



Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see guidance on shared bike lane/turn lane, bicycle signals, and colored bike facilities.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

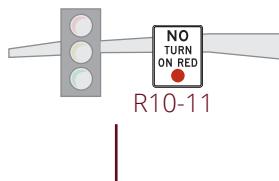
Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

Bike Box

Description

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

No Turn on Red
restriction for motorists



May be combined with
intersection crossing markings
and colored bike lanes in
conflict areas

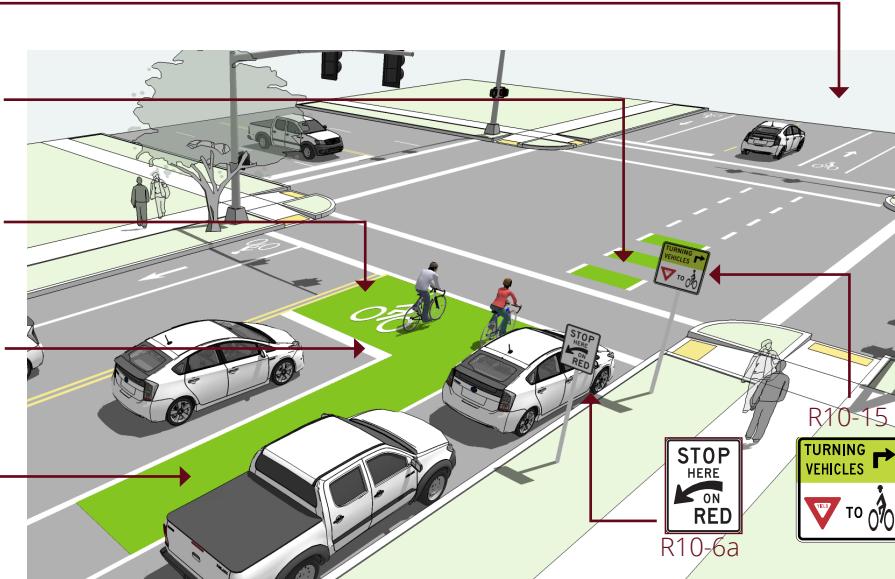
Colored pavement can be
used in the box for increased
visibility

Wide stop lines used for
increased visibility

If used, colored pavement
should extend 50' from the
intersection

Guidance

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.



Discussion

Bike boxes are considered experimental by the FHWA. Bike boxes should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.
FHWA. Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. 2011.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

Two-Stage Turn Boxes

Description

Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side separated or conventional bike lane.

On right side separated bike lanes, bicyclists are often unable to merge into traffic to turn left due to physical separation, making the provision of two-stage left turn boxes critical. Design guidance for two-stage turns apply to both conventional and separated bike lanes.

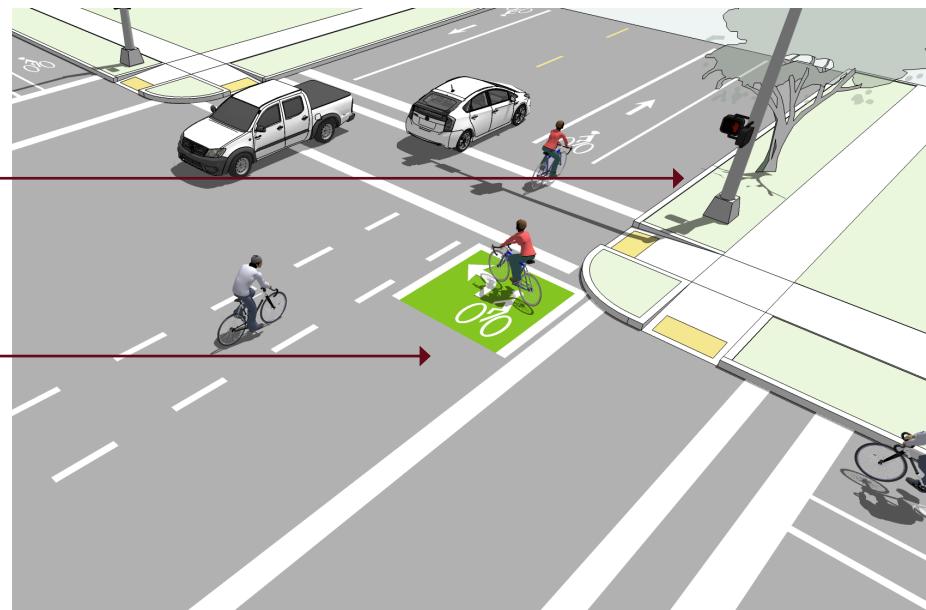
Turns from separated bike lanes may be protected by a parking lane or other physical buffer

Turns from a bicycle lane may be protected by an adjacent parking lane or crosswalk setback space.

Consider using colored pavement inside the box to further define the bicycle space

Guidance

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or separated bike lane buffer area.
- 6.5' minimum depth of bicycle storage area
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed on the cross street to prevent vehicles from entering the turn box.



Discussion

Two-Stage turn boxes are considered experimental by FHWA. While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through street, followed by one for the cross street) before proceeding.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

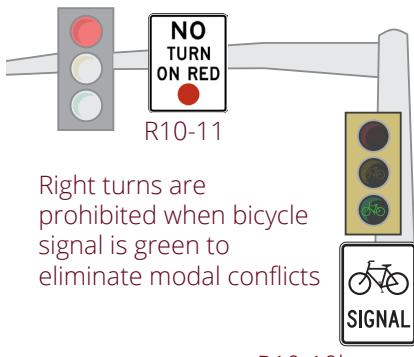
Paint can wear more quickly in high traffic areas or in winter climates.

Bicycle Signal Heads

Description

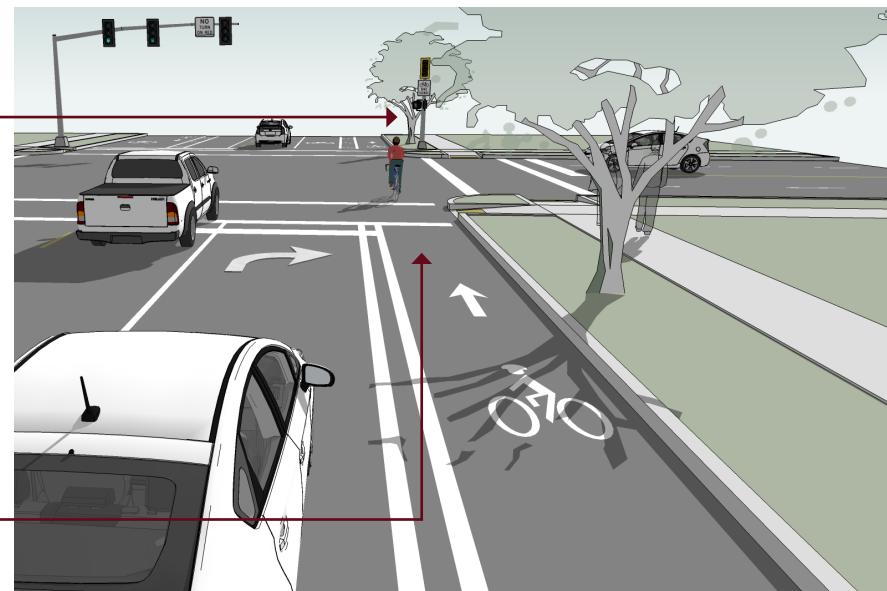
A bicycle signal is an electrically powered traffic control device that should only be used in combination with an existing traffic signal. Bicycle signals are typically used to improve identified safety or operational problems involving bicycle facilities. Bicycle signal heads may be installed at signalized intersections to indicate bicycle signal phases and other bicycle-specific timing strategies. Bicycle signals can be actuated with bicycle sensitive loop detectors, video detection, or push buttons.

Bicycle signals are typically used to provide guidance for bicyclists at intersections where they may have different needs from other road users (e.g., bicycle-only movements).



R10-10b sign clarifies proper usage

Bicycle signals must utilize appropriate **detection and actuation**



Discussion

Local municipal code should be checked or modified to clarify that at intersections with bicycle signals, bicyclists should only obey the bicycle signal heads. For improved visibility, smaller (4 inch lens) near-sided bicycle signals should be considered to supplement far-side signals.

Additional References and Guidelines

FHWA. *MUTCD - Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)*. 2013.
NACTO. *Urban Bikeway Design Guide*. 2012.

Guidance

Specific locations where bicycle signals have had a demonstrated positive effect include:

- Those with high volume of bicyclists at peak hours
- Those with high numbers of bicycle/motor vehicle crashes, especially those caused by turning vehicle movements
- At T-intersections with major bicycle movement along the top of the "T"
- At the confluence of an off-street bike path and a roadway intersection
- Where separated bike paths run parallel to arterial streets

Materials and Maintenance

Bicycle signal heads require the same maintenance as standard traffic signal heads, such as replacing bulbs and responding to power outages.

Appendix A

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A bike lane crossing of a high speed, motor vehicle priority off-ramp near Hwy 97 in Oregon

7: Bicyclists and Pedestrians at Interchanges

Introduction

Interchanges are grade-separated crossings where one roadway, typically a higher-order facility such as a limited-access freeway, is connected to another highway or surface street by high-speed ramps. In communities bisected by freeways, interchanges often provide the sole access point for several miles, but the presence of ramps often do not allow for safe or comfortable connections for bicycles or pedestrians.

The safest interchange configurations are those where motorists must slow down or stop before entering or exiting the highway, such as where the ramp intersects the cross-street at a 90 degree angle and is either signal or stop-controlled at the intersection. This design provides maximum priority for bicycle riders and pedestrians crossing the ramps and reduces impact severity in case of a collision because of slower vehicle speeds.

Interchanges that have free-flow slip ramps encourage turning movements at high speeds and can cause conflicts with pedestrians and bicyclists wishing to cross. This configuration creates major access barriers and can deter all but the most confident bicyclists. The most vulnerable road users, such as the elderly, children or people with disabilities, will particularly have difficulty with navigating through these facilities.

In these situations, crossings should be clearly marked and signed, and designed as perpendicular as possible to the ramp to increase visibility and safety for pedestrians and bicycles.

Channelized Turn Lanes

Description

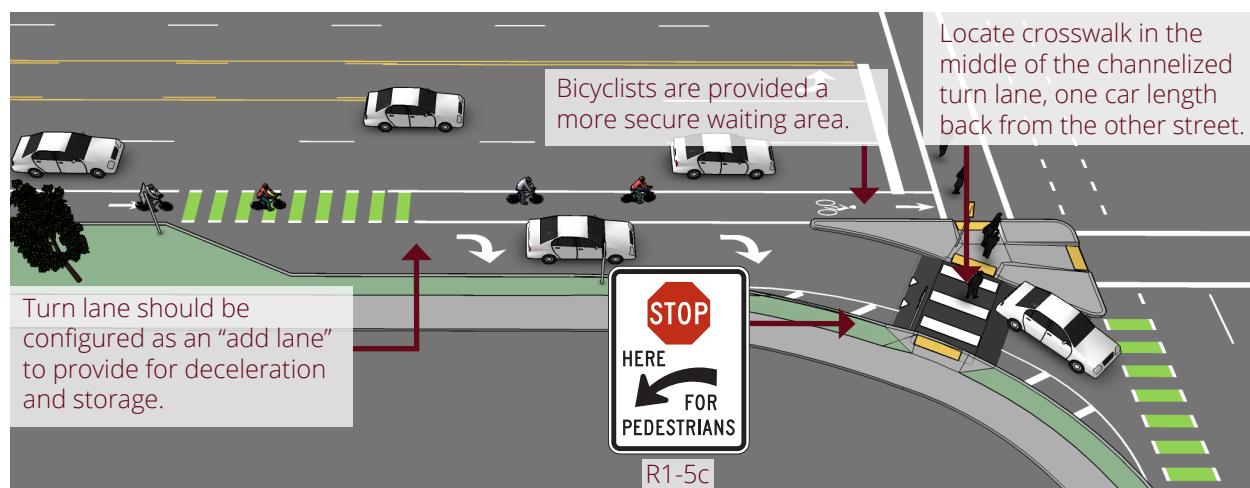
In some intersections of arterials streets, design vehicle requirements or intersection angles may result in wide turning radii at corners. Configuring the intersection as a channelized (or free-right) turn lane with a raised refuge island can improve conditions for pedestrians trying to cross the street.

Similar to a median refuge island, the raised refuge island can reduce crossing distances, allow staged crossing of the roadway, and improve visibility of pedestrians crossing the roadway.

To improve safety and comfort for pedestrians, measures to slow traffic at the pedestrian crossing are recommended such as provision of a raised crosswalk, signalized pedestrian walk phase, high visibility crosswalk, and/or pedestrian crossing signage.

Guidelines

- The preferred angle of intersection between the channelized turn lane and the roadway being joined is no more than 15 degrees to allow for simultaneous visibility of pedestrians and potential roadway gaps.
- Design with a maximum 30-35 foot turning radius.
- Signing: Pedestrian crossing sign assembly (W11-2) or Yield (R1-2) to encourage yielding. Yield to Bikes (R4-4) or similar if bike lanes are present.
- Raised crossings in the channelized turn lane may slow driver speed through the turning area.



Discussion

This design requires trucks to turn into multiple receiving lanes, and may not be appropriate on the approach to streets with one through lane. Channelized turn lanes can be very challenging for blind pedestrians. NCHRP 674 identified the use of sound strips (a full lane rumble strip-like device) in conjunction with flashing beacons to increase yielding compliance.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
 TRB. *NCHRP 674 Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities*. 2011.
 ITE. *Designing Walkable Urban Thoroughfares*. 2010.

Materials and Maintenance

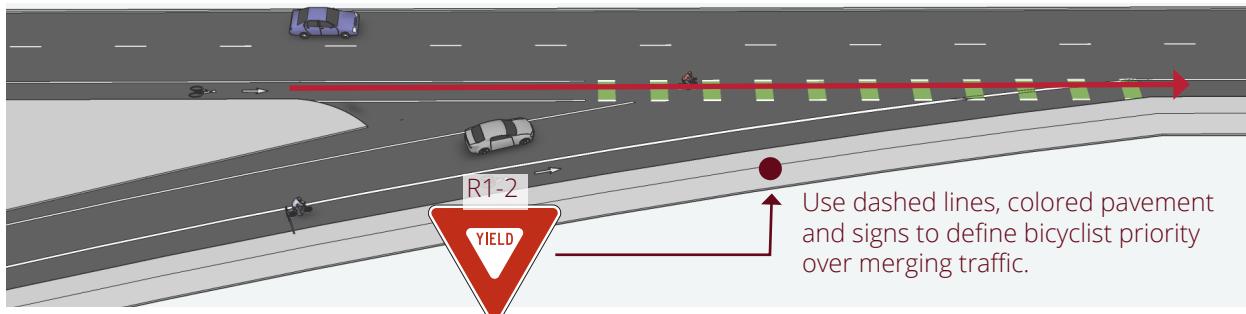
Signage and striping require routine maintenance.

Bike Lanes at Entrance Ramps

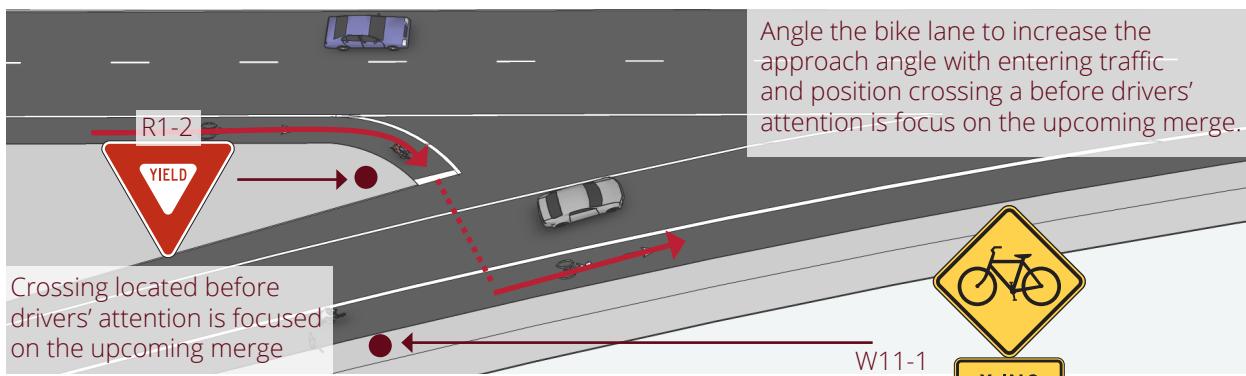
Description

Arterials may contain high speed freeway-style designs such as merge lanes which can create difficulties for bicyclists. The entrance lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles.

Low Speed Entrance Ramp (Bicycle Priority)



High Speed Entrance Ramp (Motor Vehicle Priority)



Discussion

On low-speed entrance ramps (≤ 40 mph) the bike lane should travel straight through the merge area. At high-speed entrance ramps (≥ 35 mph), with dedicated receiving lanes, bicyclists should be encouraged to yield to merging traffic and cross when safe. Even with signage and striping improvements, free-flow ramps present significant challenges for pedestrians and bicyclists; reconfiguring the intersection is the preferred treatment. While the jug-handle approach is the preferred configuration at entrance ramps, provide the option for through bicyclists to perform a vehicular merge and proceed straight through under safe conditions.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
 Caltrans. *Complete Intersections. Chapter 9: Interchanges*. 2010.
 FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
 FHWA. *Bicycle and Pedestrian Transportation. Lesson 15: Bicycle Lanes*. 2006.

Guidance

These treatments are typically found on streets with high speed freeway style merge lanes and where users are likely to be skilled adult riders.

Design strategies differ for low-speed and high-speed configurations. The bike lane should be angled to increase the approach angle with entering traffic, and the crossing positioned before drivers' attention is focused on the upcoming merge.

Materials and Maintenance

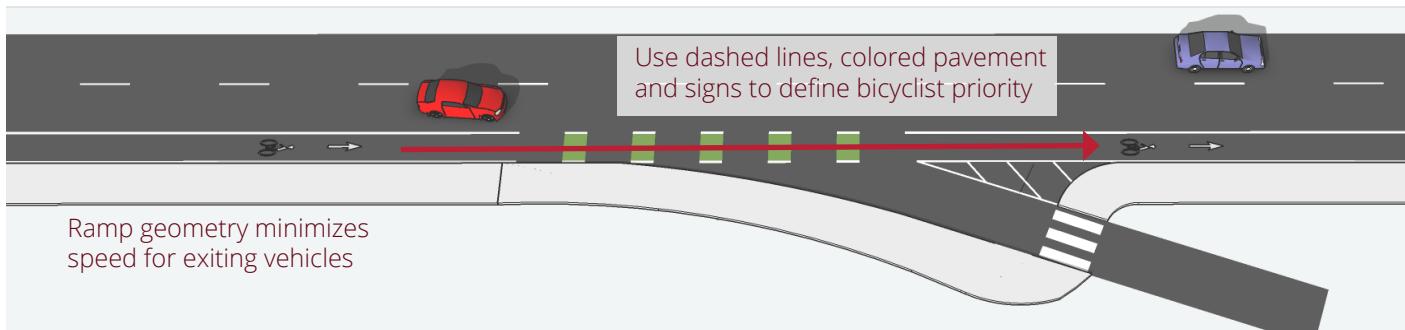
Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

Bike Lanes at Exit Ramps

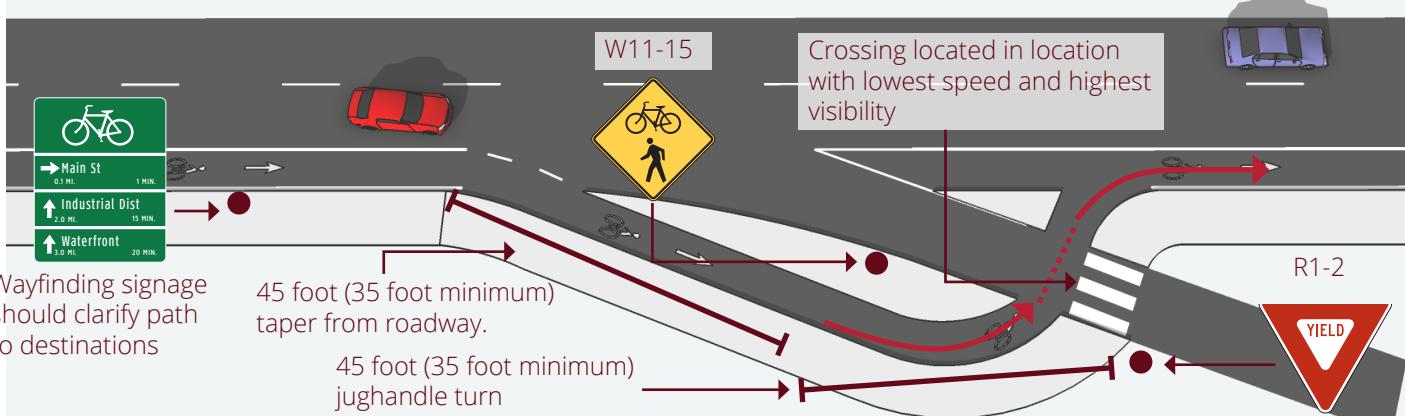
Description

Arterials with freeway-style exit ramps can create difficulties for bicyclists. Exit lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles.

Low Speed Exit Ramp (Bicycle Priority)



High Speed Exit Ramp (Motor Vehicle Priority)



Discussion

On low-speed exit ramps (≤ 40 mph), the bike lane should travel straight through the merge area. On high-speed exit ramps (≥ 45 mph), use a jug handle turn to bring bicyclists to a visible location with exiting traffic. Grade separated crossings are preferred over at-grade crossings to offer low-stress crossings of high-speed interchange ramps. Grade separation designs utilizing a bicycle path could be used if the approach ramp elevations are appropriate, and if bicycle volumes are fairly high and motor traffic volumes are high. Standard bicycle path geometric guidelines would be applied to the approaches to a grade separated crossing for a bikeway.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
 Caltrans. *Complete Intersections. Chapter 9: Interchanges*. 2010.
 FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
 FHWA. *Bicycle and Pedestrian Transportation. Lesson 15: Bicycle Lanes*. 2006.

Guidance

These treatments are typically found on streets with bicycle lanes where there are freeway-style exit ramps and where users are likely to be skilled adult riders. A jug handle turn should be used to bring bicyclists to increase the approach angle with exiting traffic, and add yield striping and signage to the bicycle approach.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

Diverging Diamond Interchange (DDI) Design

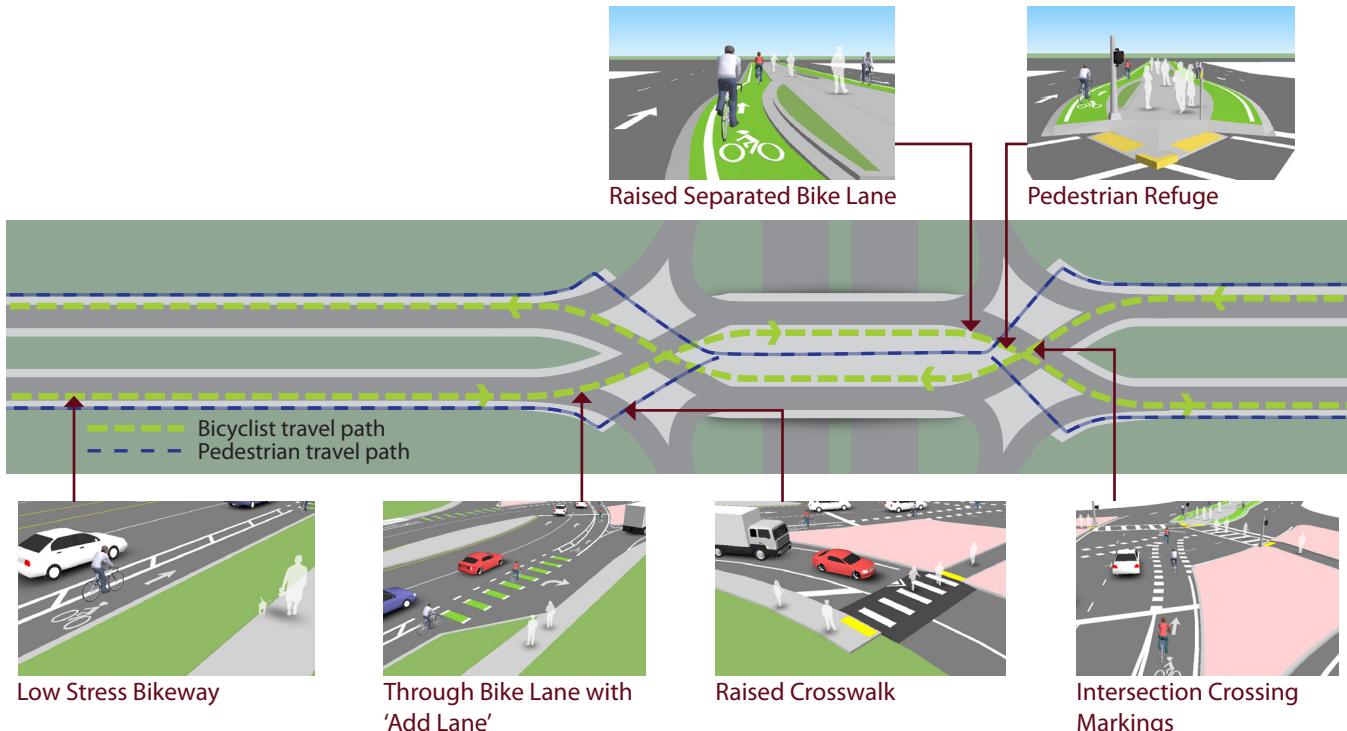
Description

The Diverging Diamond Interchange (DDI) is a modern interchange configuration designed to reduce conflict points and improve safety and performance for automobile users.

Highway interchanges are not typically comfortable for bicyclists or pedestrians due to the high speed and volume of motor vehicle traffic. Key design features at conflict areas in DDIs should be included to improve the experience for vulnerable road users such as bicyclists and pedestrians.

Guidance

- A buffered bike lane or cycle track approaching the interchange offers a lower stress approach for bicyclists.
- Through bike lane striping provides clear priority for bicyclists at right turn 'add lane' on-ramps.
- Raised crosswalks increase yielding compliance at the channelized right turn on- and off- ramps.
- A raised bike lane provides separation from moving traffic, and provides an added buffer for pedestrians.
- Median island offers a safe refuge from moving traffic.



Discussion

The on-ramps should be configured as a right-turn-only "add lane" to assert through bicyclist priority. The center running island may provide a physical barrier between the auto lanes and the cycle track or pedestrian way to provide additional protection. Elephant's feet markings (shown) offer more visibility through the intersection than conventional dotted line extensions.

Additional References and Guidelines

TRB. *NCHRP 674: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities*. 2011.
 Missouri DOT. *Engineering Policy Guide. 234.6 Diverging Diamond Interchanges*. 2012.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs. Maintenance issues of DDIs are very similar to other interchange types.

Single Point Urban Interchange (SPUI) Design

Description

A Single Point Urban Interchange (SPUI), also known as a Single Point Interchange (SPI), combines two Diamond interchanges into one at-grade intersection. Most SPUIs operate with a three-phase signal where, due to the size of the intersection, long clearance intervals are required for all movements. Although SPUIs can be efficient at moving high volumes of traffic, their signal timing and intersection configuration adversely affect pedestrians and bicyclists.

In addition to many of the issues faced by pedestrians and bicyclists at free-flow ramp intersections, the following issues specific to SPUIs also apply:

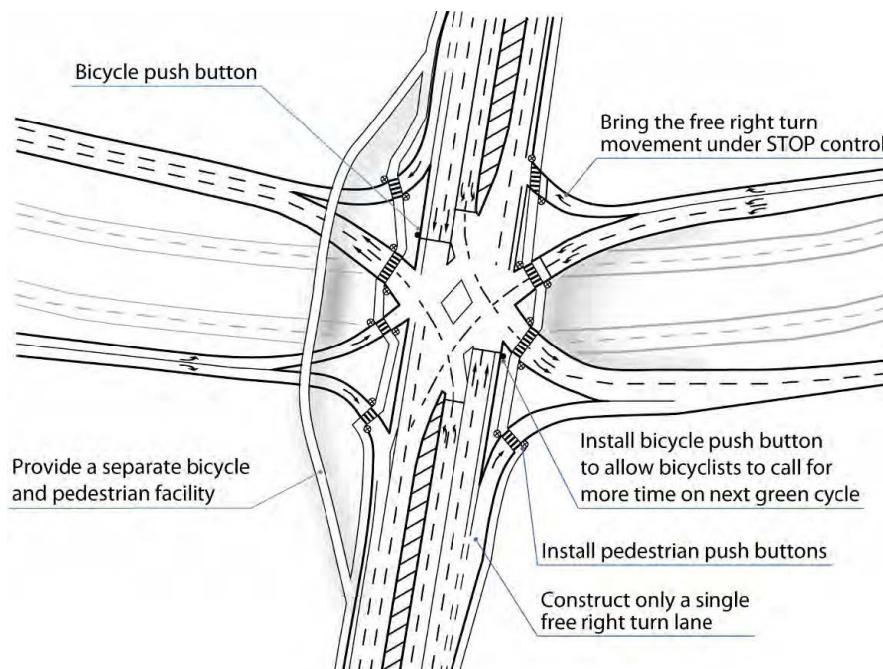
- SPUIs' large size exposes bicyclists to traffic for a longer time than other interchange types
- Typical through green phases are not long enough to allow the average person riding a

bicycle to clear the intersection

- Pedestrians can only cross a portion of the interchange in a single signal cycle and as many as four signal cycles may be required to allow a pedestrian to cross the interchange
- Pedestrians are prohibited from crossing the local street at an SPUI

Guidance

- Stripe high visibility crosswalks at all possible conflict points
- Construct a compact SPUI if a separated bicycle facility will not be provided
- Design single turn lanes to clarify right of way, and reduce weaving conflicts, pedestrian crossing distances, and multiple threat
- Install passive detection for bicyclists and pedestrians and automatically adjust signal timing to allow these users enough time to clear the intersection



Additional References and Guidelines

Caltrans. *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians*. 2010.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs. Maintenance issues of SPUIs are very similar to other interchange types.



Curb extensions (or a choker or neckdown) at 100 West & Center St in Kaysville (Photo: Shaunna Burbidge)

8: Traffic Calming

Introduction

Motor vehicle speeds affect the frequency at which automobiles pass bicyclists as well as the severity of collisions that can occur. Maintaining motor vehicle speeds closer to those of pedestrians and bicyclists greatly improves comfort for pedestrians, bicyclists, and other vulnerable road users on a street. Slower vehicular speeds also improve motorists' ability to see and react to pedestrians and bicyclists and minimize conflicts at driveways and other turning locations.

Traffic calming can be applied on streets where a reduction of vehicle speeds and/or volumes is desired. Traffic calming measures may reduce the design speed of a street and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds. In short, traffic calming is a physical means of reducing speeds, whereas a speed limit sign is only a regulatory means of doing so.

All traffic calming operates on the principle of deflecting the direction of motor vehicles and interfering with the ability to travel a straight, level path. Vertical deflection such as speed humps, maintains a vehicles straight path, but requires a sudden, brief elevation change. Horizontal shifts, such as chicanes, require vehicles to travel a tightly

meandering path and can narrow the visual field to reduce travel speeds.

Traffic calming measures that can be implemented in Kaysville are included in this section as well as in the *Kaysville City Traffic Calming Procedures* document, adopted in late 2015 by the Kaysville City Council.



Vertical Traffic Calming

Description

High motor vehicle speeds affect pedestrians and bicyclists by decreasing comfort for vulnerable users, decreasing motorists' reaction times, and increasing the severity of crashes that can occur. Reducing the speed differential between modes greatly improves safety and comfort for all users. Vertical speed control measures are slight rises in the pavement, on which motorists (and occasionally bicyclists) must reduce speed to cross.

Guidelines

- Bicycle boulevards should have a maximum posted speed of 25 mph and traffic calming can be used to maintain an 85th percentile speed below 22 mph.
- Speed humps are 14' long raised areas usually placed in a series across both travel lanes, though they can also be offset to accommodate emergency vehicles. Gaps can be provided in the center or by the curb for bicyclists, depending on where bicyclists are operating on a particular facility. Speed tables are longer than speed humps and flat-topped. Raised crosswalks are speed tables that are marked and signed for a pedestrian crossing.
- Speed cushions have gaps to accommodate the wheel tracks of emergency vehicles.
- Slopes of vertical traffic calming should not exceed 1:10 or be less steep than 1:25. In order to reduce the risk of bicyclists losing their balance, tapers should be no greater than 1:6. The vertical lip should be no more than a 1/4" high.

Discussion

Emergency vehicle response times should be considered where vertical deflection is used. Because emergency vehicles have a wider wheel base than passenger cars, speed lumps/cushions allow them to pass unimpeded while slowing most other traffic. Alternatively, speed tables are recommended because they cannot be straddled by a truck, decreasing the risk of bottoming out. Traffic calming can also be used to deter motorists from driving on a street prioritized for other modes, however, monitoring vehicle volumes on adjacent streets will help to determine whether traffic calming results in inappropriate volumes elsewhere. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
BikeSafe. *Bicycle countermeasure selection system*.
Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
NACTO. *Urban Street Design Guide*. 2013.



Speed Hump



Offset Speed Hump



Temporary Speed Cushion



Raised Crosswalk

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Horizontal Traffic Calming

Description

Horizontal traffic calming devices cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering.

Such measures may reduce the design speed of a street, and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds.

Guidelines

- Maintain a minimum clear width of 20 feet (or 28 feet with parking on both sides), with a constricted length of at least 20 feet in the direction of travel.
- Pinchpoints are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinchpoints (or curb extensions) are known as chokers or neckdowns. They reduce curb radii, further lower motor vehicle speeds, and shorten pedestrian crossing distances.
- Chicanes are a series of raised or delineated curb extensions, edge islands, or parking bays on alternating sides of a street forming an "S"-shaped curb, which reduce vehicle speeds by requiring motorists to shift laterally through narrowed travel lanes.
- Pinchpoints allow for traffic to exit one-way from a local street while restricting entrance to the street from one of its entrances. This treatment diverts traffic, reduces volumes on local streets, improves the quiet feel of local streets, while still allowing two-way bicycle and pedestrian traffic.



Temporary Curb Extension



Pinchpoint, Choker, or Neckdown



Chicane



Pinchpoint with Bicycle Access

Discussion

Horizontal speed control measures should not infringe on bicycle or pedestrian space. Where possible, provide a bicycle route outside of the element so bicyclists can avoid having to merge into traffic at a narrow pinch point. This technique can also improve drainage flow and reduce construction and maintenance costs. Traffic calming can also deter motorists from driving on a street. Monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes elsewhere. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
BikeSafe. *Bicycle countermeasure selection system*.
Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
NACTO. *Urban Street Design Guide*. 2013.

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Traffic Diversion

Description

Motor vehicle traffic volumes affect the operation of a bicycle boulevard or a quiet, local street. Higher vehicle volumes reduce bicyclists' and pedestrians' comfort and can result in more conflicts. Implement volume control treatments, if necessary, based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day, either occurring naturally or accomplished with diversion or calming, above which the road should be striped as a bike lane or considered a signed and/or marked shared roadway.

Guidelines

- Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on a bicycle boulevard or other local street that requires calming.
- Partial closures allow full bicycle passage while restricting vehicle access to one way traffic at that point. Pedestrian access usually remains the same and does not require modification.
- Diagonal diverters require all motor vehicle traffic to turn.
- Median diverters restrict through motor vehicle movements while providing a refuge for bicyclists and pedestrians to cross, in two stages, if necessary.
- Street closures create a "T" that encourages motor vehicles to divert onto another and restricts them from continuing on a bicycle boulevard, while bicycle travel can continue unimpeded. Full closures can accommodate emergency vehicles with the use of mountable curbs (maximum of six inches high).

Discussion

Bicycle boulevards on streets with volumes higher than 3,000 vehicles per day are not recommended, although a segment of a bicycle boulevard may accommodate more traffic for a short distance if necessary to complete the corridor. Providing additional separation with a bike lane, separated bike lane, or other treatment is recommended where traffic calming or diversion cannot reduce volumes below this threshold.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
BikeSafe. *Bicycle countermeasure selection system*.
Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
NACTO. *Urban Street Design Guide*. 2013.



Partial Closure



Diagonal Diverter



Median Diverter



Full Closure

Materials and Maintenance

Depending on the diverter type, these treatments can be challenging to keep clear of snow and debris. Vegetation should be regularly trimmed to maintain visibility and attractiveness.



Appendix B: Project Information

KAYSVILLE ACTIVE TRANSPORTATION PLAN
MAY 2016



Appendix A

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Introduction

The cost estimates in this appendix approximate the cost for each project recommended in the plan (spot and linear improvements). The estimates are derived from industry standards and labor and material costs from similar projects in Utah and other communities nationally. They do not include costs related to inflation, permitting, environmental impacts, contingency, engineering, design, bidding services, mobilization, traffic control, or land acquisition. Because these preliminary estimates are based on a planning-level understanding of trail components, rather than on a detailed design, they should be considered as "Order of Magnitude". American Society for Testing and Materials (ASTM) Standard E2620 defines Order of Magnitude as being accurate to within plus 50% or minus 30%. This broad range of potential costs is appropriate given the level of uncertainty in the design at this point in the process.

The estimates assume that the City will use paint when installing bike lanes, buffered bike lanes, and some pavement markings (with the exception of school crosswalks, which are specified as high-visibility, piano key-style, thermoplastic crosswalks). Paint has a considerably cheaper capital cost, but has to be maintained more often and may be more expensive when considering maintenance costs. Thermoplastic, another pavement marking material made from pre-formed or molten plastic that is melted into place with a torch, is approximately 5-6 times more expensive for initial installation, but lasts longer than paint and does not require frequent maintenance. Other project notes and disclaimers are included in each table.

The tables in this appendix are, in the following order:

Spot Improvements

Off-Street Recommendations

On-Street Recommendations

Appendix A

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Appendix A

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est.	Project Information
1	Beaumont Dr & Soccer Complex Access Path	Kaysville	Crosswalk		No	\$5,000	Improves connectivity between paths by formalizing this crossing at the corner, including curb ramps, crosswalk, and signs.
2	Bonneville Ln & Stable Trail	Kaysville	Crosswalk		No	\$5,000	Improves crossing of trail on both sides of the street by adding a crosswalk, signs, and curb ramps.
3	Mare Cir & Existing Path	Kaysville	Crosswalk		No	\$1,500	Improve crossing of existing Sunset Estates paths.
4	Mare Dr & Seabiscuit Dr	Kaysville	Crosswalk		No	\$1,500	Improve crossing of existing Sunset Estates paths.
5	Seminary Building (DHS)	Kaysville	Crosswalk	Davis School District	No	\$3,000	Install crossing for proposed path that comes from 350 S and accesses Davis High School just west of the Seminary Building.
6	200 N & 500 E	Kaysville	Full Traffic Signal		Yes	\$58,000	A full signal is planned but not yet funded for the future in the 2012 Street Plan. When bike lanes are installed, ensure that design follows plan's design guidelines and traffic calming doesn't inhibit bike lanes. Costs do not include signal.
7	200 N & Angel St	Kaysville	Full Traffic Signal		Yes	\$58,000	A full signal is planned and already funded for the near future in the 2012 Street Plan. Install crosswalks with shortened crossings on all legs of the intersection. Costs do not include signal.
8	200 N & Wellington Dr	Kaysville	Full Traffic Signal	UDOT, Davis School District	Yes	\$209,000	Should be upgraded to a full signal if West Davis Corridor is constructed. If not, downgrade to another signalized crossing.
9	Fairfield Rd & 600 N	Kaysville	Full Traffic Signal		Yes	\$58,000	A full signal is planned but not yet funded for the near future in the 2012 Street Plan. Install crosswalks with shortened crossings on all legs of the intersection. Costs do not include signal.
10	Fairfield Rd & Mutton Hollow Rd	Kaysville	Full Traffic Signal		Yes	\$58,000	A full signal is planned but not yet funded for the near future in the 2012 Street Plan. Install crosswalks with shortened crossings on all legs of the intersection. Costs do not include signal.
11	Main St & Burton Ln	Kaysville	Full Traffic Signal	UDOT	Yes	\$58,000	Planned in 2012 Street Plan, not funded. Speeds and traffic exiting and entering Burton warrant signal. Will improve connectivity for bicyclists and pedestrians, especially if Bair Creek/Nicholls path is built. Costs do not include signal.
12	Main St & Mutton Hollow Rd	Kaysville	Full Traffic Signal		Yes	\$58,000	A full signal is planned and already funded for the near future in the 2012 Street Plan. Install crosswalks with shortened crossings on all three legs of the intersection. Costs do not include signal.
13	50 W & ~ 650 S	Kaysville	Grade-Separated Crossing	USU	No	\$300,000	Working with USU to use their existing undercrossing as a shared maintenance and bike/ped crossing.
14	I-15 & Burton Ln	Kaysville	Grade-Separated Crossing	UDOT	No	\$6,700,000	Highly desired improvement to the existing bridge or addition of a dedicated bicycle and pedestrian only structure next to the existing one. A short term improvement would be installing railings or fencing on existing bridge.
15	I-15 & Center St	Kaysville	Grade-Separated Crossing	UDOT	No	\$6,700,000	A long term recommendation for E-W connections over I-15 if 200 N is not improved or if that improvement is not comfortable enough for the average person walking or riding a bicycle. Although close to the 200 N interchange, a completely low-stress crossing reflects the public's desire for improved and additional east-west connections over major barriers.
16	Mountain Rd & Bair Creek	Fruit Heights	Grade-Separated Crossing		Yes		Creek already runs underneath Mountain Rd, but access and depth of the creek and crossing will likely need to be increased. Otherwise, an adjacent tunnel should be studied and constructed giving consideration to water table levels and flood potential.
17	US-89 & 200 N	Fruit Heights	Grade-Separated Crossing	UDOT	Yes		Proposed interchange/grade separated crossing when US-89 is rebuilt. Design should incorporate bicycle and pedestrian needs.
18	US-89 & Bair Creek	Fruit Heights	Grade-Separated Crossing	UDOT	No		Not in UDOT's crossing plans, but should be in order to improve access to schools and non-roadway crossings of US-89.
19	US-89 & Crestwood Rd	Kaysville	Grade-Separated Crossing	UDOT	Yes		Proposed interchange/grade separated crossing when US-89 is rebuilt. Design should incorporate bicycle and pedestrian needs.
20	US-89 & Nicholls Rd	Fruit Heights	Grade-Separated Crossing	UDOT	No		Proposed interchange/grade separated crossing when US-89 is rebuilt. Design should incorporate bicycle and pedestrian needs.
21	200 N & Barnes Park South Entrance	Kaysville	Hybrid Beacon		Yes	\$90,000	A mid-block crossing to allow people to access Barnes Park at their most likely entry.

Appendix A

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est.	Project Information
22	D&RGW Rail Trail & 200 N	Kaysville	Hybrid Beacon		Yes	\$80,000	May be suitable for a grade-separated (under)crossing long term.
23	Main St & 320 N	Kaysville	Hybrid Beacon		Yes	\$100,000	Mid-block location for people accessing shopping. Current crash hot spot.
24	Main St & Middle DHS Parking Lot Entrance	Kaysville	Hybrid Beacon	UDOT, Davis School District	Yes	\$110,000	Will encourage pedestrians west of high school to safely access here instead of jaywalking or walking up to 1/4 mile out of their way to cross at existing lights. Curb extensions will calm traffic near school, too.
25	200 N & Flint St	Kaysville	Intersection Improvement		Yes	\$20,000	When bike lanes are installed, ensure that intersection design follows guidance in plan's design guidelines.
26	200 N & I-15 NB Offramp	Kaysville	Intersection Improvement	UDOT	Yes	\$22,000	Tighten turn radii as much as possible and add crosswalks in order to create a more comfortable pedestrian environment.
27	200 N & I-15 SB Offramp	Kaysville	Intersection Improvement	UDOT	Yes	\$22,000	Tighten turn radii as much as possible and add crosswalks in order to create a more comfortable pedestrian environment.
28	200 N & Main St	Kaysville	Intersection Improvement	UDOT	Yes	\$38,000	Narrow pedestrian crossings and allow adequate time for crossing. Tighten turn radii where possible and mitigate right turn conflicts.
29	Main St & 350 S	Kaysville	Intersection Improvement	UDOT	Yes	\$38,000	Tighten turn radii as much as possible, add curb extensions where they do not conflict with on-street bicycle recommendations, and upgrade all crosswalks to high vis in order to create a more comfortable pedestrian environment.
30	~1050 Thornfield Rd	Kaysville	RRFB	Davis School District	No	\$24,000	Improve crossing with a beacon-controlled crosswalk with traffic calming, provided it coincides with the bicycle recommendations on Thornfield.
31	~1100 Thornfield Rd	Kaysville	RRFB	Davis School District	No	\$24,000	Improve existing crosswalk to a beacon-controlled crossing with traffic calming, provided it coincides with the bicycle recommendations on Thornfield.
32	1160 S & Sunset Dr	Kaysville	RRFB		No	\$24,000	RRFB and crosswalk will allow path users to cross Sunset, neighborhoods to access D&RGW Rail Trail.
33	~1350 S 700 E	Kaysville	RRFB	Davis School District	No	\$37,000	Improve existing crosswalk by adding curb extensions and beacon signalization.
34	200 N & Bonneville Ln	Kaysville	RRFB	Davis School District	Yes	\$38,000	Improves access to school, especially during school hours when 2300 W may have heavy traffic.
35	200 W & Blooming Grove Cir	Kaysville	RRFB	Davis School District	No	\$38,000	Will improve connectivity for children walking and bicycling to school by having a beacon-controlled crossing at the crossing of a proposed path/entrance on the northwest.
36	2300 W & Antelope Way	Kaysville	RRFB	Davis School District	No	\$38,000	Improves access to school, especially during school hours when 2300 W may have heavy traffic.
37	500 E & 300 S	Kaysville	RRFB	Davis School District	No	\$24,000	Will facilitate crossing between Mountain High/DATC to Davis High School, especially for students who live north and east of DHS. May need to be upgrade to a more significant treatment in the future.
38	50 W & ~375 S	Kaysville	RRFB	Davis School District	Yes	\$24,000	Combine with curb extensions and traffic calming of some kind, provided they do not conflict with the on-street bicycle facilities.
39	Angel St & Webb Ln	Kaysville	RRFB		No	\$24,000	Add RRFB to accommodate pedestrians crossing Angel St either as a standalone project or in conjunction with Webb Ln improvements.
40	Burton Ln & Bair Creek Path	Kaysville	RRFB		No	\$24,000	Will facilitate crossing between path on the north side of Burton Ln and proposed path through open space property south of Burton.
41	Burton Ln & D&RGW Rail Trail	Kaysville	RRFB		No	\$24,000	Blind curve on Burton Ln at the location where rail trail crosses it should be upgraded to improve yielding compliance and safe crossings. Signage or alerts when cars or trail users are present may be necessary.
42	Deseret Dr & Path East of Church	Kaysville	RRFB		No	\$24,000	Adding crossing and RRFB, will connect two separate neighborhood paths.

Appendix A

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est.	Project Information
43	Fairfield Rd & Boynton Rd	Kaysville	RRFB	Davis School District	Yes	\$31,000	Existing school crossing with guard requires additional control, per complaints from guard and school about traffic speeds on Fairfield and long crosswalk. Add traffic calming, too, to shorten crossing and slow traffic.
44	Flint St & Flint Meadow Dr	Kaysville	RRFB		No	\$24,000	Allows access across Flint St and between neighborhoods, parks, trail.
45	Frontage Rd & 300 E	Kaysville	RRFB		Yes	\$38,000	Will improve access to and from Rotary Trail and Hess Farms neighborhood.
46	Frontage Rd & Fox Pointe Dr	Kaysville	RRFB		Yes	\$38,000	Will improve access to and from Rotary Trail and Hess Farms neighborhood.
47	Green Rd & 700 E	Kaysville	RRFB	Davis School District	No	\$38,000	Combine with curb extensions and traffic calming of some kind.
48	Green Rd & 900 E	Kaysville	RRFB	Davis School District	No	\$38,000	Combine with curb extensions and traffic calming of some kind.
49	Lake Ridge Dr & South Endeavor Elementary Entrance	Kaysville	RRFB	Davis School District	No	\$37,000	Will improve connectivity for children walking and bicycling to school by having a beacon-controlled crossing at one of the entrances.
50	Laurelwood Dr & 800 E	Kaysville	RRFB		No	\$24,000	RRFB will allow users coming from or going to DATC or the Bair Creek/Nicholls Path to cross Laurelwood Dr.
51	Mutton Hollow Rd & Alfred Ave	Kaysville	RRFB		Yes	\$24,000	Existing school crossing on one leg of intersection should be improved on as many legs as possible and at least one be beacon-controlled.
52	Mutton Hollow Rd & Fox Run	Kaysville	RRFB	Davis School District	No	\$38,000	Existing school crossing requires an improved crossing, is roughly mid-block, and where students are accustomed to cross. Add traffic calming, too, to shorten crossing and slow traffic.
53	Shepard Ln & 25 W	Kaysville	RRFB	Davis School District	Yes	\$38,000	Combine with curb extensions and traffic calming of some kind, provided they do not conflict with on-street bicycle infrastructure. Should be installed in conjunction with sidewalks.
54	Sunset Dr & D&RGW Rail Trail	Kaysville	RRFB		No	\$24,000	Improves crossing of rail trail near the intersection.
55	Sunset Dr & D&RGW Rail Trail Connector	Kaysville	RRFB	Davis School District	No	\$24,000	Improve existing school crossing that currently has a crossing guard by adding beacons. Keeping crossing guard is recommended.
56	200 N Fresh Market	Kaysville	Secure Bike Parking		No	\$2,000	Secure bike parking for grocery store customers.
57	200 N Park and Ride	Kaysville	Secure Bike Parking	UTA	No	\$5,000	Secure bike parking for bus commuters.
58	Bowman's	Kaysville	Secure Bike Parking		No	\$2,000	Secure bike parking for grocery store customers.
59	Davis High School Auditorium	Kaysville	Secure Bike Parking	Davis School District	No	\$2,000	Secure bike parking for students. Covered, long term parking.
60	Davis High School Cafeteria	Kaysville	Secure Bike Parking	Davis School District	No	\$2,000	Secure bike parking for students. Covered, long term parking.
61	Kaysville Theater	Kaysville	Secure Bike Parking		Yes	\$5,000	Secure bike parking for theater patrons and other downtown shoppers.
62	US-89 Park and Ride	Fruit Heights	Secure Bike Parking	UTA	No		Secure bike parking for bus commuters.
63	Utah House	Kaysville	Secure Bike Parking	USU	No	\$2,000	Secure bike parking for USU employees, guests.
64	200 N & 200 E	Kaysville	TOUCAN		Yes	\$190,000	Will allow bicyclists and pedestrians to cross 200 N in order to access Fairfield Rd, because of offset. TOUCAN is applicable at intersections.
65	Crestwood Dr & 500 E	Kaysville	TOUCAN		No	\$180,000	Will allow bicycle boulevard/bike lane access across Crestwood. If vehicular cross traffic is desired with signalization, consider upgrading to a full signal.
66	Main St & Center St	Kaysville	TOUCAN	UDOT	Yes	\$190,000	Combine with curb extensions and traffic calming of some kind.
67	1250 S & 700 E/Kadie Ln	Kaysville	Traffic Calming	Davis School District	No	\$32,000	Improve school crossing by calming traffic.
68	1475 S & 700 E/Kadie Ln	Kaysville	Traffic Calming	Davis School District	No	\$32,000	Improve school crossing by calming traffic.
69	1475 S & Haight Creek Dr	Kaysville	Traffic Calming		No	\$32,000	Calm traffic with new east-west stop signs, curb extensions, trees, or signage.

Appendix A

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est.	Project Information
70	50 W & Burton Ln	Kaysville	Traffic Calming		Yes	\$43,000	Improve Ponds Park path crossing and generally calm intersection where many families access the park and many students access their schools via Burton Ln. Stop control 50 W/Frontage Rd.
71	Haight Creek Dr & 1250 S	Kaysville	Traffic Calming		No	\$30,000	Crossings may not be necessary as it is so close to Main St, but reducing turn radii and other treatments that calm speeds of people immediately exiting Main St should be implemented.
72	Sunset Dr & Smith Ln	Kaysville	Traffic Calming	Davis School District	No	\$30,000	Tighten turn radii and ensure that crosswalks and curb ramps are adequate for a school zone.
73	Sunset Dr & Western Dr	Kaysville	Traffic Calming		No	\$32,000	Add curb extensions and sidewalks to all corners and legs of intersection in order to calm it mid-way down Sunset and to provide comfortable, calmed crossings for bicyclists and pedestrians.
74	Thornfield Rd & Windsor Ln	Kaysville	Traffic Calming	Davis School District	No	\$15,000	Will calm traffic before school crossings. Ensure that traffic calming measures do not conflict with on-street bicycle recommendations.
75	Thornfield Rd & Brookshire Dr	Kaysville	Traffic Calming	Davis School District	No	\$15,000	Will calm traffic before school crossings. Ensure that traffic calming measures do not conflict with on-street bicycle recommendations.
76	Flint St & Webb Ln	Kaysville	Trailhead		No	\$75,000	Improve this de facto parking area with restrooms, water, signage, parking, interpretive center, or other amenities.
77	West Davis Corridor & Proposed Access Path	Kaysville	Trailhead	UDOT	No	\$75,000	Improve with restrooms, water, signage, parking, interpretive center, or other amenities.

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Kaysville	\$2,405,000
Kaysville & UDOT	\$14,162,000
Total	\$16,567,000

Project IDs are for Kaysville projects as well as projects in Layton, unincorporated Davis County, and Fruit Heights that would be best for Kaysville, rather than Farmington, to coordinate.

Appendix A

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Removal	Road Widening	Project Information
78	~1160 South	Kaysville	Paved Path	Sunset Dr	D&RGW Rail Trail		No	1,187	0.22	\$113,000			Formalize existing soft surface trail/access with a paved surface, signage, and crossings.
79A	200 North	Kaysville	Paved Path	West Davis Corridor	Existing Western Terminus of 200 N	UDOT	Yes	721	0.14	\$35,000			Short section of sidepath or trail access path that will be constructed if West Davis Corridor is built.
79B	200 North	Kaysville	Paved Path	Existing Western Terminus	Angel St	UDOT	Yes	3,847	0.73	\$269,000	1 side		Add a center turn lane and install a path on one side of the road in order to improve access to the school and future West Davis Corridor Trail.
79C	200 North	Kaysville	Paved Path	Angel St	~1650 W 200 N		Yes	2,879	0.55	\$203,000		Yes	Widening may be necessary in order to complete this section of the sidepath.
79D	200 North	Kaysville	Paved Path	~1650 W 200 N	D&RGW Rail Trail		Yes	587	0.11	\$28,000			Final section of this sidepath on street cross section with enough existing width.
79E	200 North	Kaysville	Paved Path	D&RGW Rail Trail	I-15 SB Off Ramp		Yes	4,588	0.87		1	Yes	A long term recommendation (#2) that requires moving curb in order to create a shared-use side path in order to accommodate safe bicycle and pedestrian travel, even if road is built out to more lanes.
79F	200 North	Kaysville	Paved Path	I-15 SB Off Ramp	Main St		Yes	3,118	0.59		1	Yes	A long term recommendation (#2) that may require moving curb in order to create a shared-use side path in order to accommodate safe bicycle and pedestrian travel, even if road is built out to more lanes.
80	200 North	Kaysville	Sidewalk	I-15 SB Off Ramp	400 W	UDOT	Yes	872	0.17	\$35,000			Sidewalk on the north side is necessary because bridge over railroad only has sidewalks on north side. Once pedestrians are at the interchange, there is no way to change sides of the road.
81	200 South	Fruit Heights	Paved Path	City Limit	Green Rd		No	1,646	0.31				Sidewalk with utility for school access. Replaces sidewalk on one side of road.
82	350 South	Kaysville	Paved Path	50 W	Main St	Davis School District	No	1,821	0.34	\$87,000			Sidewalk will encourage students to ride and walk to school without having to use the purposefully redundant on-street bike lane. Make sure driveway crossings are safe.
83	50 W to Main Connector	Kaysville	Paved Path	50 W	Main St	UDOT	No	452	0.09	\$22,000			Creating a path through or around the porkchop in some way will allow shared lanes to the east and west of Main and 50 W on 100 S to be better connected.
84B	50 West	Kaysville	Paved Path	550 S	Ponds Park	USU	Yes	3,683	0.70	\$175,000			Pave one of the existing natural surface trails on the USU property or adjacent to the road, ensure that puncture vines are not causing problems, use the existing tunnel for crossing 50 W.
85A	650 North/Mountain Rd	Fruit Heights	Paved Path	City Limits	200 N		Yes	2,120	0.40				Access to Wilderness Park.
85B	650 North	Kaysville	Paved Path	City Limits	Park Entrance		No	780	0.15	\$38,000			Access to Wilderness Park.
86	Angel St Soccer Complex Path	Kaysville	Paved Path	Soccer Complex Internal Path	Cooper St		No	177	0.03	\$17,000			Short connector that will provide access from street/neighborhood to the park.
87	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	859	0.16	\$35,000			Fill sidewalk gap near schools.
88	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	1,079	0.20	\$44,000			Fill sidewalk gap near schools.
89	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	1,014	0.19	\$41,000			Fill sidewalk gap near schools.
90	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	1,398	0.26	\$56,000			Fill sidewalk gap near schools.

Appendix A

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Removal	Road Widening	Project Information
91	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	3,060	0.58	\$123,000			Fill sidewalk gap near schools.
92	Angel Street	Kaysville	Sidewalk	Existing Sidewalk	Existing Sidewalk		No	3,109	0.59	\$125,000			Fill sidewalk gap near schools.
93	Angel Street	Kaysville	Sidewalk	Tyler's Way	Smith Ln		No	908	0.17	\$37,000			Adding sidewalk in school zone.
94	Bair Creek Trail	Kaysville	Paved Path	Burton Ln	Via la Costa Way		No	1,837	0.35	\$175,000			Conceptual alignment. Would require agreement from property owners. Part of possible recreational/walking loop.
95	Bair Creek Trail	Kaysville	Paved Path	Via la Costa Way	Main St		No	3,882	0.74	\$369,000			Conceptual alignment. Would require agreement from property owners. Part of possible recreational/walking loop.
96	Bair Creek Trail	Fruit Heights	Paved Path	Main St	Bonneville Shoreline Trail	UDOT	No	8,719	1.65				Alignment conceptual, would require buy off from property owners east of US-89.
97	Bair Creek Trail Access	Kaysville	Paved Path	700 E	Bair Creek Trail		No	307	0.06	\$30,000			Access to proposed path.
98	Bair Creek/Nicholls Park Access	Fruit Heights	Paved Path	Fence Post Rd	Bair Creek/Nicholls Path		No	278	0.05				Formalize this access to the larger east-west shared-use path along Bair Creek/Nicholls Rd.
99	Bair Creek/Nicholls Park Access	Kaysville	Paved Path	600 S	Bair Creek/Nicholls Path		No	222	0.04	\$22,000			Formalize this access to the larger east-west shared-use path along Bair Creek/Nicholls Rd.
100	Beaumont Drive	Kaysville	Paved Path	Powerline Trail	Soccer Complex Access Trail		No	256	0.05	\$13,000	1		Provides a short connection between neighborhood paths, can convert/widen one sidewalk to a path.
101	Burton Lane	Kaysville	Paved Path	Kerrybrook Dr	50 W	UDOT	No	2,596	0.49				Very critical east-west link that was one of the most requested during the plan. Links kids to schools, people to recreation, and neighborhoods to each other and to parks.
102A	Burton Lane	Kaysville	Paved Path	SW Corner of USU Property	Main St	USU	No	2,309	0.44	\$110,000			Shared-use path, design and construction in the near term. Ensure that it accommodates bicyclists and pedestrians and that transitions/access to and from the path are safe.
103	Country Way	Fruit Heights	Paved Path	200 N	Country Rd	UTA	No	1,239	0.23				Access from Country Rd to the Park and Ride. May be redundant if US-89 path is built.
104	Deseret Drive	Kaysville	Paved Path	Existing Path	Existing Path @ Kays Dr		No	228	0.04	\$11,000			Fill in short gap along Deseret Dr. in neighborhood paths.
105A	Endeavor Elementary Northwest Access	Kaysville	Paved Path	200 W	Endeavor Elementary	Davis School District	No	280	0.05	\$27,000			Formalize path between 200 W (and Shepard Ln, farther west) and Endeavor Elementary in order to create a safe access to the school, especially for students coming from the north and from Sunset Dr.
105B	Blooming Grove Circle	Kaysville	Paved Path	Shepard Ln	200 W		No	519	0.10	\$25,000			Short path and side path between proposed sidewalks on Shepard Ln to 200 W and eventually to Endeavor.
106	Foxhunter Dr Extension	Kaysville	Paved Path	Existing Park Path	Northern Terminus		No	239	0.05	\$23,000			Fills gap between proposed bike lanes on Foxhunter Dr and internal park path to the north of its current end.
107B	Lloyd Rd/Country Ln	Fruit Heights	Paved Path	Bella Vista Dr	Bair Creek/Nicholls Park Access		No	1,968	0.37				Sidepath with utility for school access. Replaces sidewalk on one side of road.
108B	Mutton Hollow Road	Kaysville	Path + SLM	Fairfield Rd	City Limits		Yes	1,140	0.22	\$229,000	1	Yes	Bring curb line on south side out to create a bicycling and walking path for uphill bicyclists and all peds in the place where a pedestrian lane currently exists.
108C	Mutton Hollow Road	Layton	Path + SLM	City Limits	US-89		Yes	7,365	1.39		1	Yes	Bring curb line on south side out to create a bicycling and walking path for uphill bicyclists and all peds in the place where a pedestrian lane currently exists.
109	New DATC Road East	Kaysville	Paved Path	200 S	800 E	DATC	No	1,566	0.30				Sidepath to be constructed as part of DATC campus buildout.

Appendix A

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Removal	Road Widening	Project Information
110	Old Mill/Center St I-15 Crossing	Kaysville	Paved Path	600 W	400 W	UDOT	No	875	0.17				Long term recommendation for E-W connections over I-15 if 200 N is not improved or if it is not comfortable enough for the average person walking or riding a bicycle. Although close to the 200 N interchange, a completely low-stress crossing reflects the public's desire for improved and additional east-west connections over major barriers.
111	Schick Farm Park	Kaysville	Paved Path	City Limit	200 N		No	1,537	0.29	\$147,000			Completing connection between powerline corridor trail planned in Layton and 200 N/school in Kaysville. Formalizes one of the existing park paths.
500A	Shepard Lane	Kaysville	Paved Path	D&RGW Rail Trail	City Limit	UDOT	Yes	1,388	0.26	\$66,000		Yes	One of the most requested improvements in the plan. Requires a retrofit of existing structure to add path or a new bike/ped-specific bridge over I-15. UDOT may be planning a new interchange at Shepard Ln. In that case, ensure low stress facilities.
112	Shepard Lane	Kaysville	Sidewalk	Sunset Dr	D&RGW Rail Trail		Yes	3,945	0.75	\$158,000			Long sidewalk gap. Should be improved along with roadway (bike lanes).
113	Shepard Lane	Kaysville	Sidewalk	Sunset Dr	D&RGW Rail Trail		Yes	3,760	0.71	\$151,000			Long sidewalk gap. Should be improved along with roadway (bike lanes).
114	Smith Lane	Kaysville	Sidewalk	Angel St	Sunset Dr		No	1,870	0.35	\$75,000			Adding sidewalk in school zone.
115	Smith Lane	Kaysville	Sidewalk	Thomas Dr	Angel St		No	705	0.13	\$29,000			Adding sidewalk in school zone.
116	Sunset Drive	Kaysville	Sidewalk	~550 S Sunset	Cottonwood Dr		No	2,857	0.54	\$115,000			Adding sidewalk on at least one side of Sunset in or near the school zone.
117	Sunset Exterior Trail	Kaysville	Paved Path	Existing Sunset Interior Trail	Sunset Dr		No	312	0.06				Proposed to be built as part of Sunset Equestrian Estates' Concept Plan.
118A	Sunset Park/Pioneer Park	Kaysville	Paved Path	Angel St	Sunset Park Access Interior Trail		No	362	0.07	\$35,000			Connection to Sunset Equestrian Estates' trail through new City park.
118B	Sunset Park Access Interior Trail	Kaysville	Paved Path	New Sunset Development Street	Pioneer Park		No	385	0.07				Proposed to be built as part of Sunset Equestrian Estates' Concept Plan.
119	Sunset School Connection Trail	Kaysville	Paved Path	School District Property	New Sunset Development Street	Davis School District	No	193	0.04				Proposed to be built as part of Sunset Equestrian Estates' Concept Plan.
120	Sunset Sewer Access Interior Trail	Kaysville	Paved Path	School District Property	New Sunset Development Street	Davis School District	No	1,707	0.32				Proposed to be built as part of Sunset Equestrian Estates' Concept Plan.
121	Sunset Trail Adjacent to Roadway	Kaysville	Paved Path	Sunset Park Access Interior Trail	Sunset Interior Trail		No	667	0.13				Proposed to be built as part of Sunset Equestrian Estates' Concept Plan.
122A	US-89	Layton	Paved Path	?	Mutton Hollow	UDOT	Yes	3,036	0.58				When US-89 is reconstructed, path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.

Appendix A

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Removal	Road Widening	Project Information
122B	US-89	Kaysville	Paved Path	City Limits	City Limits	UDOT	Yes	2,927	0.55	\$140,000			When US-89 is reconstructed, path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.
123C	US-89	Fruit Heights	Paved Path	City Limits	Lloyd Rd Ped Bridge	UDOT	Yes	9,931	1.88				When US-89 is reconstructed, path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.
124D	US-89	Fruit Heights	Paved Path	Lloyd Rd Ped Bridge	Main St	UDOT	No	2,826	0.54				When US-89 is reconstructed, path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.
125	Webb Lane	Kaysville	Paved Path	Angel St	Flint St		No	2,483	0.47	\$118,000			Though widening may not be necessary to install the proposed path, widening Webb may provide opportunities for better pedestrian connectivity and on-street bicycle infrastructure.
501A	West Davis Corridor	Kaysville	Paved Path	?	City Limit	UDOT	Yes	21,426	4.06				Approximate alignment of Kaysville's segment of the trail that will accompany the proposed West Davis Corridor highway. City will pay for maintenance, UDOT to construct. If highway and trail are not constructed, more extensive and comfortable improvements on the D&RGW Rail Trail, especially at crossings, should be made so that it is as comfortable and easy to use as the Legacy Parkway Trail.
126	West Davis Sunset Estates Access	Kaysville	Paved Path	West Davis Corridor	Existing Sunset Estates Path	UDOT	No	316	0.06	\$31,000			Access to Sunset Estates neighborhood from West Davis Corridor through narrow, empty parcel.
127	West Davis/Legacy Connector	Kaysville	Paved Path	West Davis Corridor Trail	City Limit	UDOT	Yes	2,440	0.46	\$232,000			Connection between Legacy and West Davis Corridor through utility or WDC parcel.

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Project IDs are for Kaysville projects as well as projects in Layton, unincorporated Davis County, and Fruit Heights that would be best for Kaysville, rather than Farmington, to coordinate. When on-street and off-street segments are part of the same project, they share a project ID. When the project will be done by both Kaysville and Farmington, the projects have a 500 series ID.

Kaysville	65,205	12.35	\$2,977,000
Kaysville & UDOT	36,470	6.91	\$837,000
Total	101,675	19.26	\$3,814,000

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information	
128A	100 East	Kaysville	Buffered BL	200 N	100 S		No	1,784	0.34	\$6,000			100 East and 200 East may seem redundant, but they serve different purposes and different destinations. This one is critical to the signal at Fairfield. Convert angled to back-in angled parking on one side and convert to parallel on the other side.	
128B	100 East	Kaysville	Shared Lane	100 S	Main St		No	512	0.10	\$700			Install shared lane markings and provide a path/access for bicyclists to move between Main St and 100 E. Add wayfinding signage to divert traffic off of Main.	
129A	100 South	Kaysville	Shared Lane	300 W	Main St		No	1,393	0.26	\$1,900			Serves as a connector between Main and 300 West, and to points east of Main St and 50 W.	
129B	100 South	Kaysville	Shared Lane	Main St	200 E		No	1,111	0.21	\$1,500			Serves as a connector between Main and 200 East, and to points west of Main St and 50 W.	
130A	100 South/760 East	Kaysville	Bike Boulevard	Center St	100 S		No	816	0.15	\$2,200			Calm traffic around and provide access to Burton Elementary.	
130B	100/200 South/700 East	Kaysville	Bike Boulevard	760 E	City Limit		No	1,889	0.36	\$5,000			Calm traffic around and provide access to Burton Elementary.	
131A	1475 South	Kaysville	Bike Lane	500 E	Haight Creek Dr		No	1,675	0.32	\$4,500			An important connection through Hess Farms neighborhood and to and from Windridge Elementary.	
131B	1475 South	Kaysville	Buffered BL	Haight Creek Dr	1800 N		No	495	0.09	\$1,500	2 sides		Width exists to implement on-street facilities immediately, linking Kaysville and Farmington through a low-stress street connection.	
132	1550 South	Kaysville	Bike Boulevard	500 East	Haight Creek Dr		No	1,263	0.24	\$3,300			Calm traffic around and provide access to Windridge.	
133	1950 South/Kerrybrook Drive/Kay Circle	Kaysville	Bike Boulevard	25 W	D&RGW Trail		No	1,440	0.27	\$3,800			Connects Endeavor Elementary and neighborhood west of the former rail corridor with the D&RGW Rail Trail.	
134	200 East	Kaysville	Buffered BL	200 N	Main St		No	3,034	0.57	\$9,500	1		100 East and 200 East may seem redundant, but they serve different purposes and different destinations. This one is critical to Davis, Kaysville Jr, and points west.	
135A 1	200 North	Kaysville	Bike Lane	D&RGW Rail Trail	I-15 SB Off Ramp		Yes	4,588	0.87	\$9,500	2		Short term recommendation for 200 N that will work in existing right of way, even if road is restriped to add two more lanes, as long as lanes are no more than 10.5' and center lane is 10'.	
135A 2	200 North	Kaysville	Separated BL	D&RGW Rail Trail	I-15 SB Off Ramp		Yes	4,588	0.87		2	Yes	A long term recommendation (#1) that requires moving curb in order to create separated bike lanes in order to accommodate safe bicycle travel, even if road is built out to more lanes. Accommodates one mode instead of both.	
135B 1	200 North	Kaysville	Buffered BL	I-15 SB Off Ramp	Main St	UDOT	Yes	3,117	0.59	\$6,400	2		Short term recommendation for 200 N that will work in existing right of way and will only affect parking (removing it).	
135B 2	200 North	Kaysville	Separated BL	I-15 SB Off Ramp	Main St		Yes	3,116	0.59		2		A long term recommendation (#1) that does not require moving curb in order to create separated bike lanes in order to accommodate safe bicycle travel, even if road is built out to more lanes. Improves pedestrian experience by increasing buffer to cars.	
135C	200 North	Kaysville	Bike Lane	Main St	600 E	UDOT	Yes	3,772	0.71	\$10,000			Critical regional bikeway.	
135D	200 North	Kaysville	Bike Lane	600 E	Brook Haven Dr		Yes	2,350	0.45	\$5,600	1		Maintain parking on south (uphill) side of roadway.	
135E	200 North	Kaysville	Buffered BL	Brook Haven Dr	City Limit		Yes	955	0.18	\$83,000	2	Yes	Section that will need widening regardless of facility type. Improve to buffered bike lane if possible.	

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
135F	200 North	Fruit Heights	Buffered BL	City Limit	US-89		Yes	1,296	0.25		2		Fruit Heights section oft-requested facility on 200 North, connecting Fruit Heights and Kaysville.
136	300 South	Kaysville	Bike Lane	Davis High School	500 E	Davis School District	No	923	0.17	\$1,900	2		If removing parking from both sides is not possible because of demand, consider shared lane markings or a sidepath to link students coming from the east to the high school.
137A	300 West/600/700 North/Cemetery Road	Kaysville	Bike Boulevard	Existing Path	Crestwood Rd	Layton	No	6,135	1.16	\$16,000			Neighborhood connection to Main St, cemetery, using traffic calming and diversion, and crossing at Fairfield Rd.
137B	300 West	Kaysville	Buffered BL	Existing Path	Main St		No	1,123	0.21	\$3,300	2		Bike lane will increase access and comfort for bicyclists near strip mall and neighborhoods to the north and east.
137C	300 West	Kaysville	Bike Boulevard	Main St	50 W	UDOT	No	6,462	1.22	\$16,900			A critical alternative to Main St in downtown Kaysville, where bicycle facilities do not currently fit. This alignment takes advantage of two new signals to cross 200 N and Main St.
138	350 South	Kaysville	Bike Lane	50 W	Main St		No	1,523	0.29	\$3,600	1		Purposefully redundant on-street bike lane to ensure that a connection is made for confident bicyclists as well as all other ages and abilities.
139	50 East/2200 South	Kaysville	Shared Lane	Shepard Ln	Existing Path		No	1,005	0.19	\$1,400			Short, on-street connection too short to be a bicycle boulevard, but essential to linking neighborhood to the south and schools and homes to the north and on Shepard Ln.
84A	50 West	Kaysville	Buffered BL	Main St	550 S		Yes	3,121	0.59	\$9,800	1		Remove parking from one side of road to accommodate buffered bike lanes. Will improve regional bicycle network off of Main St and connections to schools, parks, downtown.
140A	500 East	Kaysville	Bike Lane	Crestwood Rd	300' South of Crestwood Rd		No	251	0.05	\$50,000		Yes	Critical link behind Davis High School, through neighborhoods, and across 200 N, without the need to remove parking.
140B	500 East	Kaysville	Bike Lane	300' South of Crestwood Rd	Creek		No	618	0.12	\$1,700			Critical link behind Davis High School, through neighborhoods, and across 200 N, without the need to remove parking.
140C	500 East	Kaysville	Bike Lane	Creek	~Oak Ln		No	210	0.04	\$40,000		Yes	Piece that needs widening of critical link behind Davis High School, through neighborhoods, and across 200 N, without the need to remove parking.
140D	500 East	Kaysville	Bike Lane	~Oak Ln	Main St		No	5,864	1.11	\$15,600			Critical link behind Davis High School, through neighborhoods, and across 200 N, without the need to remove parking.
505A	500 East	Kaysville	Bike Lane	Northern Terminus	1800 S		No	3,784	0.72	\$10,100			On-street bicycle infrastructure can be installed immediately without removing parking or repaving.
505B	500 East	Kaysville	Bike Boulevard	1800 S	City Limit		No	190	0.04	\$500			Calm neighborhood entrance to allow bicyclists and pedestrians to feel comfortable accessing neighborhood and Frontage Rd path.
142	550 South	Kaysville	Bike Lane + SLM	50 W	Main St		No	2,693	0.51	\$5,400			Because of grade, install bike lane uphill and a shared lane downhill. For this facility type, parking should be maintained on uphill side or wide parking lane on downhill side should be provided.
143	600 West	Kaysville	Bike Lane	200 N	Old Mill Ln		No	1,333	0.25	\$3,200	1		Bike lanes will offer a connection to the Park and Ride and to 200 N, Downtown in general.
144	600/800 East/Lambert/Cherrywood Drive	Kaysville	Bike Boulevard	Laurelwood Dr	Bair Creek/Nicholls Access Trail		No	1,776	0.34	\$4,700			Provide connection between neighborhoods, schools, DATC, and Bair Creek/Nicholls Trail.

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
145	650 East	Kaysville	Bike Boulevard	1475 S	1550 S		No	546	0.10	\$1,500			Calm traffic around and provide access to Windridge.
146	700 East/Kadie Ln	Kaysville	Bike Boulevard	1200 S	1475 S		No	1,557	0.29	\$4,100			Calm traffic in front of and around Windridge.
147A	Angel Street	Layton	Bike Lane	Layton Pkwy	City Limit		No	1,770	0.34			Yes	Layton's section of Angel, needs to be widened prior to implementation.
147B	Angel Street	Kaysville	Bike Lane	City Limit	200 N		No	2,706	0.51	\$470,000		Yes	Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
147C	Angel Street	Kaysville	Bike Lane	200 N	Cooper St		No	2,568	0.49	\$5,300	2		Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
148D	Angel Street	Kaysville	Bike Lane	Cooper St	Galbraith Ln		No	1,934	0.37	\$4,600	1		Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
148E	Angel Street	Kaysville	Bike Lane	Galbraith Ln	~600 S Angel St		No	1,866	0.35	\$3,900	2		Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
148F	Angel Street	Kaysville	Bike Lane	~600 S Angel St	Tyler's Way		No	552	0.10	\$1,300	1		Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
148G	Angel Street	Kaysville	Bike Lane	Tyler's Way	Smith Ln		No	1,011	0.19	\$2,100	2		Pavement improvements (remove chip seal for smoother surface) and restriping in order to improve connectivity for bicyclists.
148H	Angel Street	Kaysville	Bike Lane	Smith Ln	Cross Section Change		No	1,471	0.28	\$3,500	1		Install bike lane on section that does not need widening and can fit a bike lane without taking away both sides of parking.
148I	Angel Street	Kaysville	Bike Lane	Cross Section Change	West Davis Corridor		No	3,457	0.65	\$7,100	2		Both sides of parking necessary to be removed, unless cross section is widened an additional 15-16 feet. Special consideration should be given to off-street parking when new parks, churches are built.
149	Antelope Way	Kaysville	Bike Boulevard	2300 W	Bonneville Ln		No	297	0.06	\$800			Provides access to school from other bicycle boulevard.
150	Bonneville Lane	Kaysville	Bike Boulevard	200 N	Angel St		No	3,850	0.73	\$10,100			Neighborhood bicycle boulevard on streets without as much traffic, where possible, and that provide a connective route through the middle.
102B	Burton Lane	Kaysville	Bike Lane	50 W	SW Corner of USU Property		No	2,239	0.42	\$6,000			On-street connection between path to the east and long-term path and structure over I-15.
151A	Burton Lane	Kaysville	Bike Lane	Sunset Dr	Driftwood Ln		No	753	0.14	\$130,000		Yes	On-street connection between path to the east and Sunset Dr on the west. Road should be widened and surface improved as well in order to prevent crashes caused by potholes, crumbling shoulder, etc.
151B	Burton Lane	Kaysville	Bike Lane	Driftwood Ln	D&RGW Rail Trail		No	1,264	0.24	\$3,000	1		On-street connection between path to the east and Sunset Dr on the west. Road surface should be improved as well in order to prevent crashes caused by potholes, crumbling shoulder, etc.
152A	Center Street	Kaysville	Bike Boulevard	400 W	300 W		No	602	0.11	\$1,600			A long term recommendation for E-W connections over I-15 if 200 N is not improved.

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
152B	Center Street	Kaysville	Bike Boulevard	300 W	City Limit	UDOT	No	6,290	1.19	\$16,400			An essential piece of a bicycle boulevard alternative to Main St downtown, where bicycle facilities do not currently fit. Dedicated crossing at Main St (TOUCAN; right in, right outs). Connector to downtown if bike/ped crossing of I-15 is constructed.
153	Clover Meadow Road	Kaysville	Bike Boulevard	Mutton Hollow Rd	Eastern Terminus		No	1,036	0.20	\$2,700			Provides access to schools and inner neighborhood connections, traffic calming.
154	Cooper/Preston/Haywood/Wellington	Kaysville	Bike Boulevard	200 N	Angel St		No	4,872	0.92	\$12,700			Neighborhood bicycle boulevard on streets without as much traffic, where possible, and that provide a connective route through the middle.
155	Country Road	Fruit Heights	Bike Lane + SLM	City Limits	US-89		No	3,377	0.64				Because of grade, install bike lane uphill and a shared lane downhill. For this facility type, parking should be maintained on uphill side or wide parking lane on downhill side should be provided.
156	Creekside Lane	Kaysville	Bike Boulevard	Clover Meadow Rd	Creekside Way		No	1,527	0.29	\$4,000			Provides access to schools and inner neighborhood connections, traffic calming.
157	Crestwood Road	Kaysville	Bike Lane + SLM	Main St	US-89		No	9,736	1.84	\$16,400			Because of grade, install bike lane uphill and a shared lane downhill. For this facility type, parking should be maintained on uphill side or wide parking lane on downhill side should be provided.
158	Deseret Drive	Kaysville	Buffered BL	Old Mill Ln	Burton Ln		No	9,085	1.72	\$26,400	2		Existing road has enough room to install buffered bike lanes without any modification, except parking restriction.
159A	Fairfield Road	Kaysville	Buffered BL	City Limit	Mutton Hollow Rd		No	318	0.06	\$1,000	2		Add buffered bike lanes on Fairfield until city limit. Layton's master transportation plan recommends an identical facility north of the city limit.
159B	Fairfield Road	Kaysville	Bike Lane	Mutton Hollow Rd	Boynton Ln		Yes	2,112	0.40	\$5,000	1		Important connection to Fairfield Jr and to most of east Layton. May have traffic calming effect as well.
159C	Fairfield Road	Kaysville	Buffered BL	Boynton Ln	200 N		Yes	3,292	0.62	\$10,300	1		Add center turn lane. If no center turn lane, then parking on both sides can be retained.
160A	Flint Street	Kaysville	Bike Lane	City Limit	200 N		No	2,701	0.51	\$5,600	2		On-street alternative to the D&RGW for through, confident bicyclists and those seeking access to neighborhoods.
160B	Flint Street	Kaysville	Bike Lane	200 N	Church Parking Lot Entrance		No	526	0.10	\$1,100	2		On-street alternative to the D&RGW for through, confident bicyclists and those seeking access to neighborhoods.
160C	Flint Street	Kaysville	Bike Lane	Church Parking Lot Entrance	Barnes Dr		No	946	0.18	\$2,300	1		On-street alternative to the D&RGW for through, confident bicyclists and those seeking access to neighborhoods.
160D	Flint Street	Kaysville	Bike Lane	Barnes Dr	Old Mill Ln		No	2,477	0.47	\$5,100	2		On-street alternative to the D&RGW for through, confident bicyclists and those seeking access to neighborhoods.
161	Galbraith Lane	Kaysville	Bike Boulevard	West Davis Corridor	Angel St		No	2,922	0.55	\$7,600			Implement a bicycle boulevard to connect two major north-south arteries for bicyclists and pedestrians.
162	Haight Creek Drive	Kaysville	Bike Lane	Main St	1550 S		No	2,699	0.51	\$6,400	1		On-street bicycle infrastructure will help to calm traffic on this road. Parking should be removed from the east side.
163	Kerrybrook/Baer Creek/200 West	Kaysville	Bike Boulevard	Burton Ln	Blooming Grove Cir		No	2,414	0.46	\$6,300			Calm traffic around and provide access to Endeavor Elementary.

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
164A	Laurelwood Drive	Kaysville	Bike Lane	Main St	US-89		No	4,184	0.79	\$11,100			Road has a significant enough grade that downhill bike lane should be made wider than normal, but not so much that motorists park in it. Right of way is wide enough to keep both sides of parking. Not redundant with Nichols b/c of connections to schools.
164B	Laurelwood Drive	Fruit Heights	Bike Lane	Main St	US-89		No	1,856	0.35				Road has a significant enough grade that downhill bike lane should be made wider than normal, but not so much that motorists park in it. Right of way is wide enough to keep both sides of parking. Not redundant with Nichols b/c of connections to schools.
503A	Main Street	Kaysville	Buffered BL	City Limit	400 W		Yes	2,245	0.43	\$7,600			Critical link in regional bicycle network, providing access to multiple cities as well as to businesses along Main St. May also have traffic calming effect, too., as people "enter" Downtown.
503B	Main Street	Kaysville	Buffered BL	400 W	200 N		Yes	2,530	0.48	\$7,400	2		Critical link in regional bicycle network, providing access to multiple cities as well as to businesses along Main St. May also have traffic calming effect, too., as people "enter" Downtown.
503C	Main Street	Kaysville	Shared Lane	200 N	Center St	UDOT	Yes	1,211	0.23	\$1,600			Calm traffic and reduce speed limit as much as possible here. Short connection between bike lanes, otherwise, bicyclists should be redirected to 100 E, 200 E, or 300 W.
503D	Main Street	Kaysville	Bike Lane	Center St	100 S	UDOT	Yes	699	0.13	\$1,700	1		Ensure that traffic is calmed enough in order to create a gateway to downtown and the safest crossings/interactions possible between automobiles, bikes, and ped, especially for school kids.
503E	Main Street	Kaysville	Buffered BL	100 S	200 S	UDOT	Yes	803	0.15	\$1,700	2		Ensure that traffic is calmed enough in order to create a gateway to downtown and the safest crossings/interactions possible between automobiles, bikes, and ped.
503F	Main Street	Kaysville	Buffered BL	200 S	550 S	UDOT	Yes	2,492	0.47	\$6,800	1		Ensure that traffic is calmed enough near high school to provide the safest crossings/interactions possible between automobiles, bikes, and ped.
503G	Main Street	Kaysville	Buffered BL	550 S	650 S	UDOT	Yes	1,072	0.20	\$93,200	2	Yes	Critical link in regional bicycle network, and especially for students riding and walking to school.
503H	Main Street	Kaysville	Separated BL	650 S	City Limit	UDOT	Yes	5,534	1.05	\$530,000	2		Requires UDOT approval and possible testing, but with few driveways and crossings, it may be a perfect candidate for the UDOT's first. Responsibility for maintenance would rest with the City. Choose buffered bike lane if protection is not feasible.
108A	Mutton Hollow Road	Kaysville	Buffered BL	Main St	Fairfield Rd		No	4,152	0.79	\$13,000	1		Improves access to schools and will effectively calm traffic in school zone.
165A	Nicholls Road	Fruit Heights	Buffered BL	Main St	Park West Parking Lot		No	3,638	0.69				An on-street and shorter term alternative to the Nicholls/Bair Creek path. Connects Fruit Heights and Kaysville.
165B	Nicholls Road	Fruit Heights	Buffered BL	Park West Parking Lot	US-89		No	1,539	0.29		1		Will require converting diagonal to parallel parking.

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
165C	Nicholls Road	Fruit Heights	Bike Lane + SLM	US-89	Mountain Rd	UDOT	No	1,943	0.37		1		Because of grade, install bike lane uphill and a shared lane downhill. For this facility type, parking should be maintained on uphill side or wide parking lane on downhill side should be provided.
166	Old Mill Lane	Kaysville	Bike Lane	Flint St	600 W		No	3,256	0.62	\$7,700	1		Viable alternative to 200 N for east-west traffic.
167	Phillips Street	Kaysville	Bike Boulevard	Angel St	Flint St		No	5,072	0.96	\$13,200			Neighborhood bicycle boulevard on streets without as much traffic, where possible, and that provide a connective route through the middle, and to the D&RGW Rail Trail.
504A	Shepard Lane	Kaysville	Bike Lane	Sunset Dr	City Limit		Yes	5,376	1.02	\$920,000	2	Yes	Road must be improved before bike lanes and sidewalks can be added. Existing roadway is narrow, with soft shoulders. Improving it will enhance pedestrian connectivity, especially near schools.
168	Smith Lane	Kaysville	Bike Lane	Angel St	Sunset Dr		No	1,947	0.37	\$4,600	1		Important link to schools and neighborhood, even though sidewalks are not continuous.
169A	Sunset Drive	Kaysville	Bike Lane	Flint Ln	Western Dr		No	5,817	1.10	\$13,700	1		Important for bicyclists even though sidewalks are not continuous.
169B	Sunset Drive	Kaysville	Bike Lane	Western Dr	~100' North of Saddle Back Cir		No	1,042	0.20	\$2,200	2		Sunset Dr is a regionally significant bicycle route and improving shoulders to bike lanes to accommodate through bicycle and other recreational traffic will benefit all active transportation users.
169C	Sunset Drive	Kaysville	Bike Lane	~100' North of Saddle Back Cir	~250' South of Paddock Ln		No	440	0.08	\$1,100	1		Sunset Dr is a regionally significant bicycle route and improving shoulders to bike lanes to accommodate through bicycle and other recreational traffic will benefit all active transportation users.
169D	Sunset Drive	Kaysville	Bike Lane	~250' South of Paddock Ln	Shepard Ln		No	2,640	0.50	\$450,000	2	Yes	Sunset Dr is a regionally significant bicycle route and improving shoulders to bike lanes to accommodate through bicycle and other recreational traffic will benefit all active transportation users.
170A	Thornfield Road	Fruit Heights	Bike Lane	Mutton Hollow Rd	City Limit		No	755	0.14		1		Ensure that traffic calming does not affect bike lane and that roadway remains low speed. Will improve access to school and to neighborhoods from collectors to north and south.
170B	Thornfield Road	Kaysville	Bike Lane	City Limit	Crestwood Rd		No	2,620	0.50	\$6,200	1		Ensure that traffic calming does not affect bike lane and that roadway remains low speed. Will improve access to school and to neighborhoods from collectors to north and south.
171A	US-89 Frontage Road	Layton	Bike Lane	?	25 S	UDOT	Yes	2,732	0.52				When US-89 is reconstructed, a path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.
171B	US-89 Frontage Road	Kaysville	Bike Lane	City Limit	City Limit	UDOT	Yes	2,174	0.41	\$5,800			When US-89 is reconstructed, a path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.

Appendix A

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Road Widening	Project Information
171C	US-89 Frontage Road	Fruit Heights	Bike Lane	City Limit	Nichols Rd	UDOT	Yes	7,439	1.41				When US-89 is reconstructed, a path should be constructed on the side that frontage roads are not. Will provide a place for runners, walkers, and bicyclists to travel, while frontage roads can have bike lanes for more confident bicyclists.
107A	Village Way/Bella Vista Dr	Fruit Heights	Bike Boulevard	Country Rd	Country Ln		No	2,498	0.47				Calm traffic around and provide access to Burton Elementary.
172A	Western Drive	Kaysville	Buffered BL	Angel St	Sunset Dr		No	2,953	0.56	\$8,600	2		Removing parking will not cause problems as all houses face inward. Will connect Angel and Sunset Estates to the Rail Trail.
172B	Western Drive	Kaysville	Bike Boulevard	Sunset Dr	Deseret Dr		No	2,381	0.45	\$6,200			Links Sunset Estates to D&RGW Rail Trail and Deseret Dr, possibly points east.
173	White Willow Drive	Kaysville	Shared Lane	Flint St	Willowmere Dr		No	298	0.06	\$400		Yes	Short connection to inner-neighborhood park and paths.
174	Willowmere Drive	Kaysville	Shared Lane	White Willow Dr	Neighborhood Path Access		No	378	0.07	\$500			Short connection between proposed path/park path and outer neighborhood path on Old Mill.

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Project IDs are for Kaysville projects as well as projects in Layton, unincorporated Davis County, and Fruit Heights that would be best for Kaysville, rather than Farmington, to coordinate. When on-street and off-street segments are part of the same project, they share a project ID. When the project will be done by both Kaysville and Farmington, the projects have a 500 series ID.

Kaysville Only	198,749	37.64	\$2,589,800
Kaysville & UDOT	17,102	3.24	\$647,200
Total	215,851	40.88	\$3,237,000

Total Kaysville Only	263,954	49.99	\$7,971,800
Total Kaysville & UDOT	53,572	10.15	\$15,646,200
Kaysville Grand Total	317,526	60.14	\$23,618,000

Appendix A

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Appendix C: Priority Projects

KAYSVILLE ACTIVE TRANSPORTATION PLAN
MAY 2016



Appendix A

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Introduction

The project team, with direction from City staff, identified three priority projects for Kaysville from the recommended facilities included in Chapter 4 and *Appendix B: Project Information*. Each priority project in this appendix includes one or two cut sheets that include more information than what appears in the project information tables or on the recommendations maps, such as benefits, maps, graphics, context, and estimated cost information. Developing Kaysville's priority projects in this way is critical to communicating the City's priorities as well as pursuing future funding and grant opportunities.

The recommendations in this appendix and the plan as a whole may change as the City changes, as priorities shift, and as opportunities arise to complete project. The plan should be considered a fluid document that will move with the City. Some of the projects may need to be implemented incrementally and specific recommendations may be altered; specific and recommended facility types are the ultimate goal, but other treatments may need to be used in the interim.

Projects #3, #7, and #8 are regionally significant projects that should be implemented together with Farmington City as they will extend beyond Kaysville City limits. These projects do not benefit only residents or visitors of one city, but will improve connectivity and safety for everyone.

Project #1: 200 North I-15 Interchange Improvements

Project Description

Kaysville residents desire improved existing and additional new **connections between the west and east side of the City that are comfortable for all users**, especially at the 200 North I-15 interchange. Although specific facility recommendations are not included in this priority project cut sheet, different treatment types and designs for three types of interchanges (DDI, SPUI, and Diamond (existing)) are included in Section 7 of *Appendix A: Design Guidelines* in order to inform the City and to UDOT as bicycling and walking infrastructure is upgraded.

Context

The 200 North I-15 interchange is the only access to the freeway for motor vehicles in Kaysville and accommodates about 22,000 cars per day. The closest alternatives for bicyclists and pedestrians to cross I-15 are Layton Parkway in Layton to the north (1.7 miles; 35 minutes walking each way) and Burton Lane in Kaysville to the south (2.2 miles; 43 minutes walking each way). Neither of these crossings comfortably accommodate the average Kaysville resident walking or bicycling.

Because of poor connectivity for people walking or riding bicycles at this interchange, nearly all residents on one side of I-15 cannot access amenities, services, and homes on the opposite side on foot or by bicycle, including grocery stores, the D&RGW Rail Trail, Barnes Park and other parks, and schools.

Benefits

Proposed improvements to the 200 North I-15 interchange, either as part of a retrofit of the existing interchange or incorporation of improved facilities in a future design iteration, will improve perceived comfort and safety; connectivity between the east and the west across I-15; access to transit, amenities, and services; and other economic, environmental, health, and quality of life benefits.



Existing conditions for people walking and bicycling on or across 200 North at the I-15 interchange



Existing sidewalk and shoulder under I-15 do not comfortably accommodate pedestrians or bicyclists, especially those with disabilities

Costs

Project costs vary widely for this type of project and are dependent on when and if the existing facilities are improved to a different type of interchange or if a retrofit is pursued. This priority project does not include detailed cost estimates and it is recommended that Kaysville City, Davis County, and UDOT undertake a feasibility study in order to identify in greater detail the possible future improvements to the site, bicycling and walking facility types, materials, location, surveying, and implementation schedule for the interchange area.

Project #2: Burton Lane I-15 Crossing Improvements

Project Description

This priority project is based on Project #3: Shepard Lane I-15 Crossing Improvements, which was originally developed for Farmington City. Due to conditions, opportunities, and constraints being similar, the following recommendations are also similar.

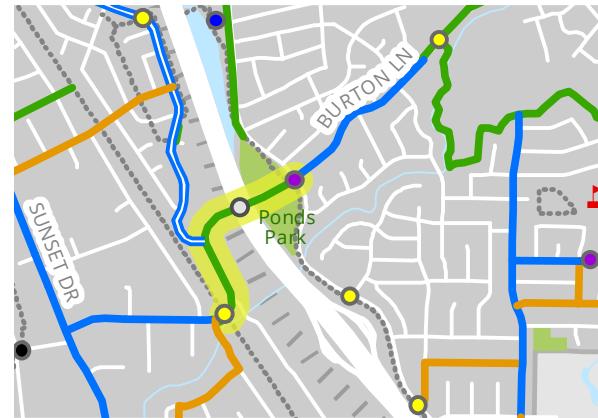
One of the principal goals of the Active Transportation Plan is to “unite the east and west, especially across US-89, I-15, and Legacy Parkway, with bicycle and pedestrian improvements that are safe enough to feel comfortable riding with a young child.” Several plans, including the WFRC Wasatch Front Urban Area 2030 Bicycle Plan, recommend improved crossings over I-15.

Improvements to Burton Lane between the D&RGW Rail Trail and 50 West (crossing Interstate 15 and the Union Pacific and UTA rail corridor) were among the most requested by the public during the Active Transportation Plan. A shared-use path adjacent to the roadway will require a retrofit of the existing bridge structure to add width to the road deck and space for a path on one side. An alternative to including a path on the retrofitted bridge is to construct a separate bicycle and pedestrian-specific structure.

Context

The Burton Lane I-15 overpass is one of only two non-interchange crossings of I-15 and the UPRR/UTA corridor (the other is Shepard Lane in Farmington) in the seven miles between State St/Clark Ln in Farmington and Gentile Street in Layton.

Several of Kaysville and Farmington's I-15 overpasses, including Burton Lane, currently have “Bicycles May Use Full Lane” signs and shared lane pavement markings, or sharrows. These existing treatments



Context map of the Burton Lane improvements. One can see the freight rail corridor and the extents of the project highlighted in yellow (D&RGW Rail Trail to 50 West). Blue lines represent proposed bike lanes, green shared-use paths, and orange bicycle boulevards. All dashed gray lines are existing facilities

are insufficient to encourage anyone outside of the very strong and brave to cross on a bicycle, and the road deck is not wide enough currently to accommodate pedestrians safely. Nearly all crossings of I-15, and especially at Burton Lane, are physical and psychological barriers to connectivity and the use of active transportation modes.

Because of poor connectivity, nearly all residents on one side of I-15 cannot access amenities, services, and homes on the opposite side on foot or by bicycle, including the D&RGW Rail Trail and other trails, parks, and schools.

Benefits

Proposed improvements to Burton Lane will improve perceived comfort and safety; connectivity between the east and the west across I-15; access to amenities and services; and other economic, environmental, health, and quality of life benefits, some of which have already been expressed in the introductory chapter of and throughout the Active Transportation Plan.

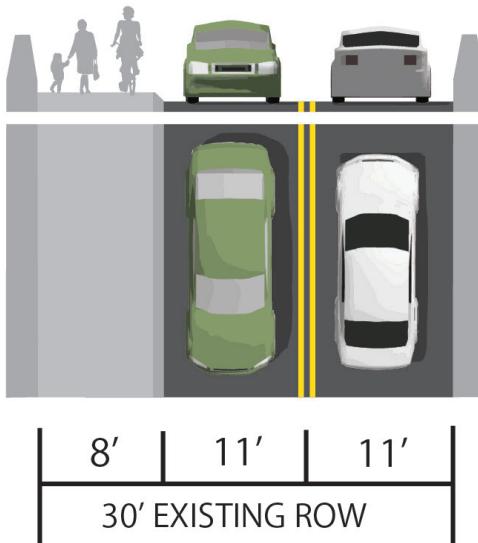
Project #2: Burton Lane I-15 Crossing Improvements (cont.)

Costs

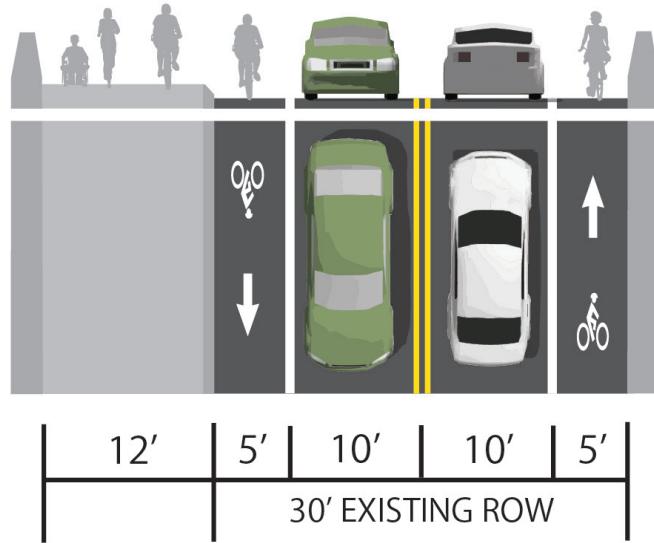
Project costs vary widely, depending on when and if the existing structure is improved as part of another project as well as the type of bicycling and walking improvements that can be implemented on the existing structure (dependent on structural analysis). Therefore, this priority project does not include detailed cost estimates. Rather, it is recommended that Kaysville City, Davis County, and UDOT undertake a feasibility study in order to identify in greater detail the possible future improvements to the site, bicycling and walking facility type, materials, location, surveying, and implementation schedule for this crossing.



Existing shared lane signage and lack of shoulder or dedicated facilities for people riding bicycles or walking on Burton Lane, looking west



Proposed cross section of recommended shared-use path improvements over I-15 at Burton Lane within existing right of way



Proposed cross section of recommended shared-use path improvements over I-15 at Burton Lane assuming a bridge retrofit and not a complete rebuild

Project #3: Shepard Lane I-15 Crossing Improvements

Project Description

One of the principal goals of the Active Transportation Plan is to “unite the east and west, especially across US-89, I-15, and Legacy Parkway, with bicycle and pedestrian improvements that are safe enough to feel comfortable riding with a young child.” Several plans, including the Kaysville Active Transportation Plan and the WFRC Wasatch Front Urban Area 2030 Bicycle Plan, recommend improved crossings over I-15.

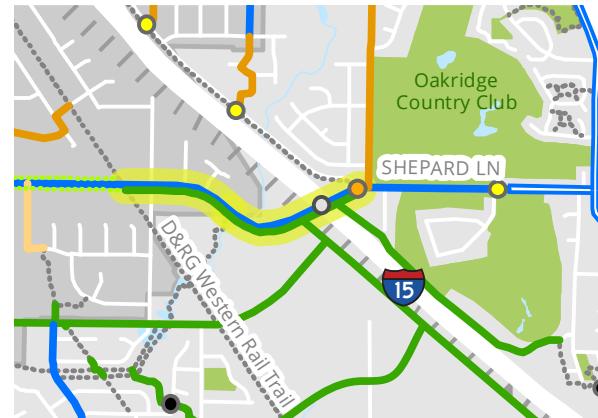
Improvements to Shepard Lane between the D&RGW Rail Trail and Oakridge Country Club (crossing Interstate 15 and the Union Pacific and UTA rail corridor) were among the most requested by the public during the Active Transportation Plan. On-street bike lanes and a shared-use path adjacent to the roadway will require a retrofit of the existing bridge structure to add width to the road deck and space for a path on one side. An alternative to including a path on the retrofitted bridge is to construct a separate bicycle and pedestrian-specific structure.

There is a possibility that a new I-15 interchange will be constructed at Shepard Lane. This priority project should be included in the design and implementation of the interchange from the beginning in order to ensure that low stress bicycling and walking facilities are available to users of all ages and abilities.

Context

The Shepard Lane I-15 overpass is one of only two non-interchange crossings of I-15 and the UPRR/UTA corridor (the other is Burton Ln in Kaysville) in the seven miles between State St/Clark Ln in Farmington and Gentile Street in Layton.

Several of Kaysville and Farmington's I-15 overpasses, including Shepard Lane, currently have “Bicycles May Use Full Lane” signs and shared lane pavement markings, or sharrows. These existing treatments are insufficient to encourage anyone outside of the very



Context map of the Shepard Lane improvements. One can see the unimproved area to the west and south, the crossing of I-15 and the rail corridor, and the extents of the project highlighted in yellow (Rail Trail to Country Club). Blue lines represent proposed bike lanes, green shared-use paths, and orange bicycle boulevards. All dashed gray lines are existing facilities

strong and brave to cross on a bicycle, and the road deck is not wide enough currently to accommodate pedestrians safely. Nearly all crossings of I-15, and especially at Shepard Lane, are physical and psychological barriers to connectivity and the use of active transportation modes.

Because of poor connectivity, nearly all residents on one side of I-15 cannot access amenities, services, and homes on the opposite side on foot or by bicycle, including a grocery store, the D&RGW Rail Trail and other trails, parks, schools, and both Farmington City and Kaysville City.

Benefits

Proposed improvements to Shepard Lane will improve perceived comfort and safety; connectivity between the east and the west across I-15; access to transit, amenities, and services; and other economic, environmental, health, and quality of life benefits, some of which have already been expressed in the introductory chapter of the Active Transportation Plan.

Additionally, improving this important crossing will connect residents, businesses, employees, and other

Project #3: Shepard Lane I-15 Crossing Improvements (cont.)

users of the currently unimproved area to the west and south of Shepard Lane, which is subject to a form-based code enacted by Farmington City and will also include complete streets and green infrastructure.

Costs

Project costs vary widely, depending on when and if the existing structure is improved to an interchange as well as the type of bicycling and walking improvements that can be implemented on the existing structure (dependent on structural analysis). Therefore, this priority project does not include detailed cost estimates. Rather, it is recommended that Farmington City, Kaysville City, Davis County, and UDOT undertake

a feasibility study in order to identify in greater detail the possible future improvements to the site, bicycling and walking facility type, materials, location, surveying, and implementation schedule for this crossing.



Existing shared lane signage on Shepard Lane, looking west



Proposed bike lanes and shared-use path over I-15, looking west

Project #4: Main Street Improvements

Project Description & Context

As a key connection between I-15, US-89, nearly all Kaysville neighborhoods, downtown, Davis High School, and several other schools, Main Street is one of Kaysville's most important streets. Currently, Main Street is the only north-south street that runs the length of Kaysville continuously east of I-15, with the exception of US-89 in Fruit Heights. This project recommends improving Main Street for all users while maintaining existing motor vehicle traffic capacity.

This project focuses on the section of Main Street between 200 N and the southern city limit. The project includes several different facility types in different contexts and segments of the roadway:

200 N to Center St. A short, shared lane section bookended by bike lanes to the south and north. At Center and 300 W, bicyclists are redirected onto 100 E, 200 E, or 300 W.

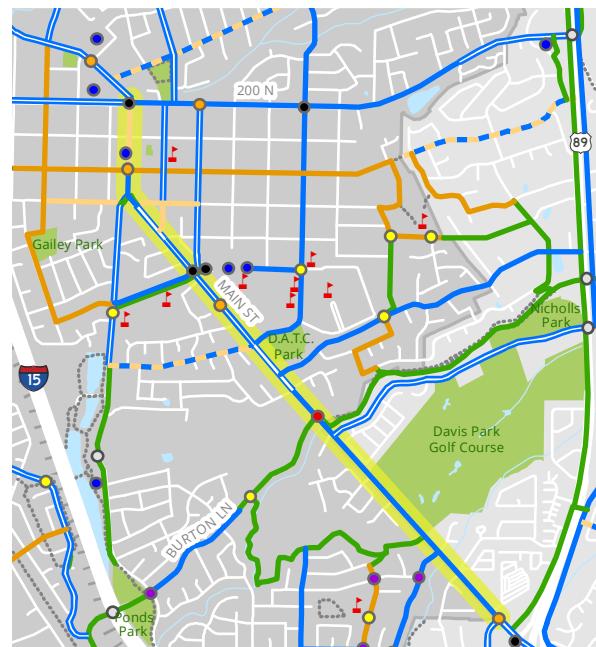
Center St to 100 S. Bike lanes will bring users to the core of downtown and help calm traffic in order to create a downtown gateway.

100 S to 650 S. Buffered bike lanes will replace both sides of on-street parking, except between 200 S and 550 S (in front of Davis High School), where only one side of parking is restricted.

650 S to Southern City Boundary. Separated, or protected, bike lanes use the same cross section as the buffered bike lanes to the north, but with a physical separation between the bike and traffic lanes.

Benefits

Save for I-15 crossing improvements, better facilities on and across Main Street in Kaysville were the most requested improvements by Kaysville residents during the Active Transportation Plan. By providing more transportation options to Kaysville residents, especially high school students and those accessing downtown, traffic and parking demand will likely be reduced.



Context map of the Main Street project, with extents highlighted in yellow. Solid blue lines represent proposed bike lanes, blue lines with a white line in the center are buffered bike lanes, blue lines with dashed white are separated bike lanes, green shared-use paths, tan shared lanes, and orange bicycle boulevards. Dashed gray lines are existing facilities



Existing conditions on Main Street near Davis High School. The road does not include a designated space for bicyclists nor mid-block crossings for pedestrians (Photo: Google)

Improving Main Street will also help people to access downtown by bike or on foot, thereby reducing congestion where it occurs most often. Additionally, bicycle improvements along and a combination of other crossing improvements across Main Street will create more and safer opportunities to move from one side of Kaysville to the other.

Project #4: Main Street Improvements (cont.)



This rendering shows what the improvements to Main Street would look like in front of Davis High School. The changes would include buffered bike lanes, green intersection markings, a hybrid beacon and new crosswalk, and center median islands where left turning traffic does not currently use them

Costs

Shared Lane Markings: \$4,000

Bike Lane Striping, Symbols, & Signs: \$1,700

Buffered Bike Lane Striping, Symbols, & Signs, and Widening: \$100,000

Separated, or Protected, Bike Lanes: \$530,000

Misc. Intersection Improvements: \$75,000

Median Refuge Islands: \$50,000

Hybrid Beacons: \$220,000

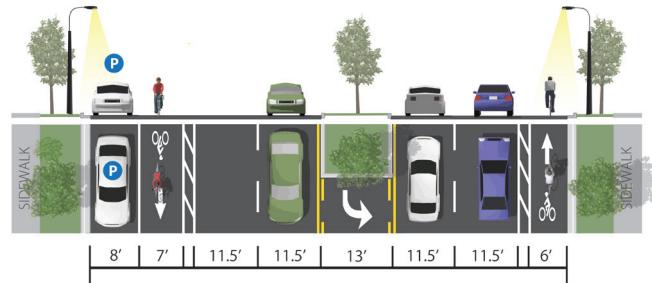
TOUCAN Signal: \$190,000

Future Signal and Crossing Improvements: \$210,000

Total Construction Costs: \$1,380,000

Total Project Costs*: \$1,725,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.



Cross section of the improvements shown in the rendering above

Project #5: Downtown Loop

Project Description

The Downtown Loop priority project is a 4.5 mile loop that includes segments of streets in Kaysville where bike lanes and bicycle boulevards are recommended. Davis High School, elementary schools, parks, almost all of Kaysville's shopping areas, multiple neighborhoods, and the cemetery are inside the oval-shaped loop. It crosses 200 N and Main St in multiple places, offering better connectivity across the city's major arterials.

Context

The loop includes all or parts of the following projects, which are also included in Chapter 4 and *Appendix B: Project Information*:

- Bike lanes on 500 East
- Uphill bike lane and downhill shared lane on 550 South
- Buffered bike lanes on 50 West and 300 West
- Bicycle boulevards (and associated traffic calming) on 300 West, 200 South, Larkin Lane, 400 South, 600 North, 240 East, 700 North, and through the Kaysville Cemetery
- RRFBs at 500 East & 300 South, and 50 West & Columbia Elementary
- TOUCAN signal at 500 East & Crestwood Road
- Future full traffic signal at 500 East & 200 North

Benefits

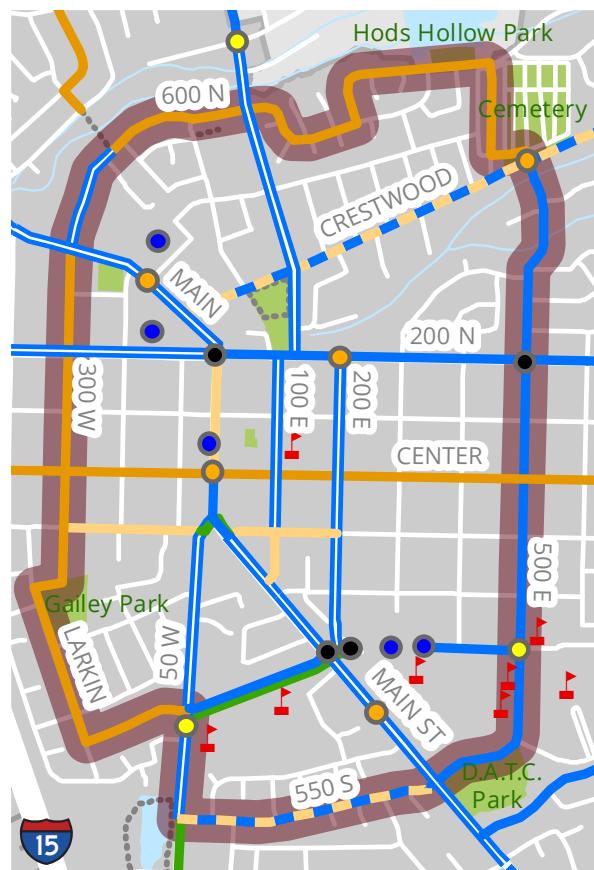
In addition to the many benefits of implementing and promoting walking and bicycling facilities and usage, the specific benefits of this larger, loop project are at least three fold:

Economic Development. The loop improves access for bicyclists and pedestrians to most of Kaysville's retail opportunities, will encourage people to ride and walk downtown, and to shop inside the loop.

Implementation Testing Ground. Because Kaysville City has yet to install on-street bicycle facilities, like

bike lanes and bicycle boulevards, the loop will allow City staff to test different implementation methods, striping techniques, traffic calming, and intersection and crossing improvements outlined in *Appendix A: Design Guidelines*. The City will be able to figure out what works best for all users and what residents respond to best before beginning citywide implementation of the rest of the recommendations in the Active Transportation Plan.

Public Outreach. The loop will also allow the City to probe public opinion in a somewhat controlled environment. User intercept surveys and public outreach to neighborhoods included in the loop will provide the City with information about how users feel in different circumstances and on different facility



Context map of the Kaysville Downtown Loop improvements. The project is highlighted in a transparent maroon. Blue lines represent proposed bike lanes or buffered bike lanes, green shared-use paths, tan shared lanes, and orange bicycle boulevards. All dashed gray lines are existing facilities

Project #5: Downtown Loop (cont.)

types, as well as allowing time for people to get used to using or driving near different facility types before citywide implementation.

Examples and Resources

Many communities across the country use bicycle and pedestrian trails or on-street loops to highlight culturally-significant destinations, shopping districts, or to cater to tourists. Some also use these designated routes to create a calmer city core that improves perceived safety and comfort for all users, especially people riding a bicycle or walking.

Downtown Greenway (Greensboro, NC)

The Downtown Greenway is a collaborative effort between the City of Greensboro and Action Greensboro. The urban loop is a 4 mile walking and bicycle trail around downtown Greensboro that "promotes fitness, connectedness, and well-being for both residents and visitors in an esthetically pleasing environment" and "serves as a key economic development tool for the community."

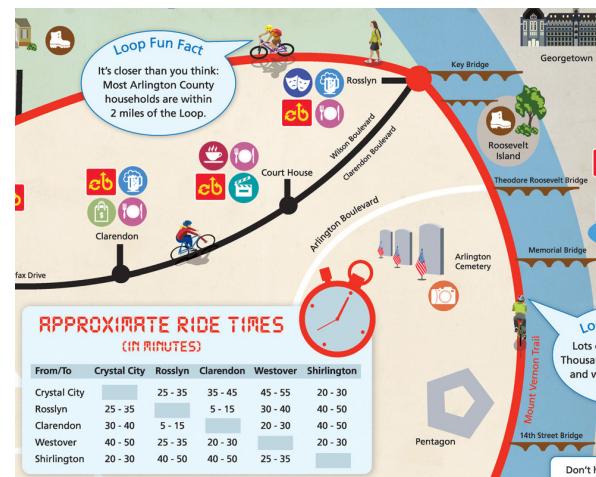
The loop includes maps for businesses, visitors, and residents that highlight neighborhoods, community gathering places, historic sites, and connections to other facilities and destinations. It differs from Kaysville's in that it is a completely off-street loop.



Part of a Downtown Greenway user map

Arlington Loop (Arlington, VA)

BikeArlington, in conjunction with the City of Arlington, created the Arlington Loop, which is comprised of 17 miles of the overall 50 mile trail system in the Arlington area that creates a loop around the center of the city and connects users to almost every amenity and destination in Arlington. The Loop also recommends shorter route options, information about what people will see on each, and approximate bicycling times between destinations.



Part of the Arlington Loop user map

Costs

Bike Lane Striping, Symbols, & Signs: \$23,000

Buffered Bike Lane Striping, Symbols, & Signs: \$8,000

Bicycle Boulevards: \$100,000

RRFBs: \$45,000

TOUCAN Signal: \$165,000

Future Signal and Crossing Improvements: \$220,000

Total Construction Costs: \$560,000

Total Project Costs*: \$700,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.

Project #6: 200 North Shared-use Sidepath

Project Description

This 1.5 mile project would create a shared-use path on the south side of 200 North, catering to bicyclists, pedestrians, joggers, and other non-motorized users of all ages and abilities. Guidance for design, implementation, and maintenance of shared-use paths along roadways, also called sidepaths, are found in *Appendix A: Design Guidelines*.

Context

The extents of this project are from the current western terminus of 200 North/Schick Lane at the western Kaysville city limits to the D&RGW Rail Trail on the east. East of this project, proposed bike lanes will allow bicyclists to travel through the I-15 interchange, downtown, and points east. Currently there are no sidewalks or any pedestrian facilities on the south side of 200 North until Mountain Vistas Rd, about 500' west of the Rail Trail, and sidewalks on the north side of the street are intermittent. The south side of the street was chosen per the lack of driveways and other conflicts.

Benefits

This project will connect residents on and north of 200 North, and from the Mountain Vistas and Hill Farms developments, as well as school-age children walking and bicycling to the currently unnamed Elementary School 62. It will provide a shared-use, separated facility that will allow west side residents to access the Rail Trail and, possibly, the West Davis Corridor Trail. Together with proposed roadway crossings, it will also connect people to new retail opportunities on the east end of the project at Flint St and 200 North.

Costs

Shared-Use Sidepath: \$350,000
Curb and Gutter: \$115,000
Driveway Aprons: \$20,000
Park Strip: \$15,000

Total Construction Costs: \$500,000

Total Project Costs*: \$625,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.



Rendering of a proposed sidepath on the south side of 200 North's west side will connect west side residents to the D&RGW Rail Trail and points east. Existing roadway conditions are shown in the top right inset.

Project #7: West Davis Corridor Trail

Project Description

Even though the establishment of a new highway on the west side of Davis County, known as the West Davis Corridor, is not guaranteed, a regional shared-use path within the highway right-of-way similar to the existing section of Legacy Parkway Trail in Farmington, is recommended, if the highway is constructed, in the Active Transportation Plan.

Most of Kaysville City's and Farmington City's initial concerns with UDOT's West Davis Corridor shared-use path pertained to post-construction operations and maintenance. These concerns have been alleviated in recent years due to each City's and Davis County's experience maintaining the D&RGW Rail Trail and the Legacy Parkway Trail, respectively.

Context

The proposed, yet approximate, alignment of the West Davis Corridor Trail extends from Farmington on the south to Syracuse on the north. It would provide a facility similar to the Legacy Parkway Trail.

Benefits

In addition to increasing recreational opportunities north and west of the current terminus of the Legacy Parkway Trail, the West Davis Corridor Trail would also connect existing and future schools and planned housing developments in Farmington and points north. Extending north toward Ogden, it would provide a parallel facility about one mile west of the D&RGW Rail Trail. It would connect Davis County cities and the region's west side residents on a grade-separated, shared-use facility appropriate for users of all ages and abilities.

Costs

UDOT has agreed to fund and construct the capital improvements for this priority project if the West Davis Corridor roadway project comes to fruition. Operations and maintenance responsibilities will be with the municipality.

Annual Cost of Regular Maintenance Activities (i.e. sweeping, trash removal, mowing, weed abatement, snow removal, crack seal, sign repair) (per mi.): \$1,500

10-Year Seal Coat (per mi.): \$10,000

Annual Maintenance Costs (4.1 miles): \$50,000



People who walk and ride a bicycle on the proposed West Davis Corridor Trail will have a similar experience to the Legacy Parkway Trail, which currently ends in Farmington

Project #8: Legacy Parkway Trail North Extension

Project Description

This priority project would extend the existing Legacy Parkway Trail in Farmington, one of the most popular, regional shared-use paths along the Wasatch Front, nearly one mile farther north, and connect, on its northern extent, with Shepard Ln (see Priority Project #3) near the Kaysville border with Farmington.

Context

Of the more than 31 miles of existing paved shared-use paths in Kaysville and Farmington, the Legacy Parkway Trail is perhaps the most used and well-known. Constructed in 2008, it initially ran from the northern terminus of I-215 near Salt Lake City, on the south, to Park Lane and the Farmington FrontRunner station, on the north. Following housing development north of Park Ln, the trail was extended an additional 1/3 of a mile to 675 N/Burke Ln.

Benefits

This extension will complete an off-street, shared-use backbone for the city's walking and bicycling network that will run uninterrupted and grade-separated the entire length of Farmington. Together with nearby recommended improvements, the trail extension will connect Kaysville City and Farmington City and provide better access to transit and shopping at Station Park, as well as regional destinations to the south.

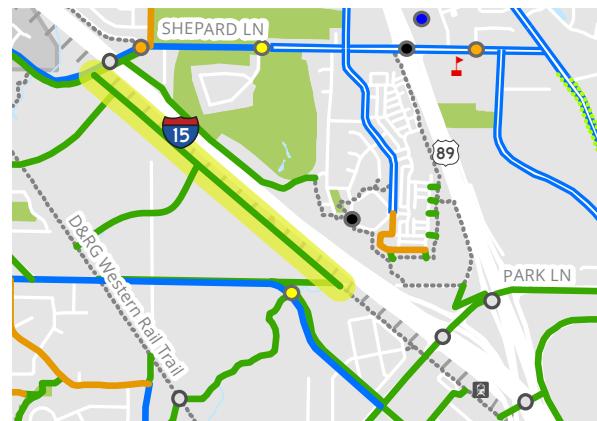
Filling this gap will also connect residents, businesses, employees, and other users to and through the currently unimproved area between the Legacy and the D&RGW trails. The area is subject to a form-based code enacted by Farmington City and will also include complete streets and green infrastructure.

Costs

Total Construction Costs: \$450,000

Total Project Costs*: \$565,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.



Context map of the north extension of Legacy Parkway Trail. One can see the unimproved area to the west, connections to transit, and the extents of the project highlighted in yellow (Shepard Ln to the current northern terminus). Blue lines represent proposed bike lanes, green shared-use paths, and orange bicycle boulevards. All dashed gray lines are existing facilities, including the existing Legacy Parkway Trail



People bicycling on the existing segment of the Legacy Parkway Trail south of the extents of this priority project



Rendering of the proposed north extension, as seen from the Shepard Ln overpass, looking south